

CIVIL SERVICE PREPARATION SERIES

Editor. HUBERT WATSON, B.Sc (ECON)

A MODERN ECONOMIC GEOGRAPHY

BY

H. A. CHAPMAN

B.Sc (SPECIAL, GEOG.), LONDON

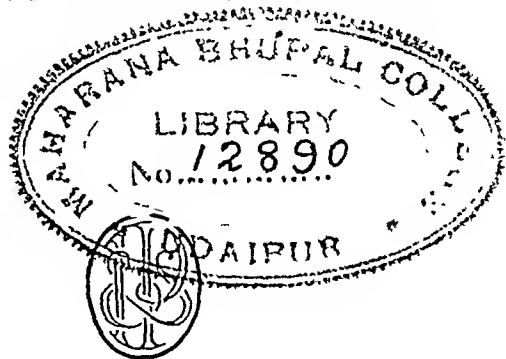
AND

P. M. SIDDONS-WILSON, B.A.

SECOND EDITION

OF

"GEOGRAPHY FOR CIVIL SERVICE CANDIDATES"



LONDON

SIR ISAAC PITMAN & SONS, LTD.

CHAPTER IV

PAGE 65

WORLD AGRICULTURE, FORST PRODUCTS AND FISHING

Cereals wheat, rice, maize, barley, rye; oats, millet

Ten, Coffee, Cacao, Sugar, Wine, Tobacco

Cattle and Sheep beef cattle, dairy produce, draught and hides, sheep, mixed farming

Clothing Materials wool, cotton, flax, silk, hemp and jute

Forst Products rubber, synthetic rubber; coco nut palms, oil palm, date-, bananas, timber soft-woods, hardwoods

Fishing North west Europe, North-east of North America, North-west of North America, Eastern Asia

Whaling

EXERCISE 4

CHAPTER V

89

POWER, MINERAL WEALTH, INDUSTRY, AND SETTLEMENTS

Power coal, sources of coal supply, oil, running water, other forms of power

Other Mineral Wealth iron ore, gold, silver, lead, zinc, tin, copper, nickel and cobalt, salt, diamonds and rubies, rayon, artificial silk, and plastics

Factors Necessary for Industrial Activity raw material, power resources, transport and markets, labour supply, climate

Human Settlements distribution of population, town sites and ports

Atlas Study and Revision

EXERCISE 5

CHAPTER VI

118

TRANSPORT AND COMMUNICATIONS

Transport (other than Railways) on Land Regions human carriers; animal transport

Inland Transport by Water Rhine, Elbe and Oder, rivers of France; canals, Vistula, Danube, Russian rivers

Ocean Transport Atlantic routes North Atlantic, South Atlantic, Atlantic routes to Africa Pacific routes to western South America, to western North America, to eastern Asia, to Australasia Routes to the East Cape route, Suez route Panama and Suez

TRANSPORT AND COMMUNICATIONS—*continued*

Airways of the World. the African service; the Eastern service, Atlantic and Pacific routes
Atlas Study and Revision.

EXERCISE 6

CHAPTER VII

ASIA 141

British Possessions

Asia General Position, physical features, climate, natural regions, mineral wealth, communications

India and Burma physical features, rainfall and agriculture, the Indian peasant; manufactures, trade and ports.

India and Pakistan divisions, populations, economic position

Siam and French Indo-China.

China physical features; climate; agriculture; manufactures, trade and ports; British footholds.

Manchukuo.

Japan. physical features; climate; agriculture and fishing, manufactures; Empire possessions; trade and towns, present situation

Atlas Study and Revision

EXERCISE 7

CHAPTER VIII

AFRICA 171

British Lands.

Position; physical features and rivers, climate

Natural Regions equatorial forests, savanna lands; British East Africa, Northern Rhodesia, Southern Rhodesia, and Bechuanaland, difficulties of development

Hot Deserts Nile valley; agriculture, main towns; trade

Northern Mediterranean Region.

Union of South Africa physical features, climate; agriculture, mineral wealth, railway communications, trade

Railways in the Rest of Africa

Islands off the Coast of Africa

Atlas Study and Revision

EXERCISE 8

CHAPTER IX

PAGE
192

AUSTRALIA AND NEW ZEALAND

British Lands

Australia position, physical features, climate, natural regions and agriculture, mineral wealth, industry, communications, population and chief towns, trade, "White Australia"

Tasmania

New Zealand position, physical features; climate, natural regions and products, mineral wealth; manufactures, trade and ports

Atlas Study and Revision

EXERCISE 9

CHAPTER X

NORTH AMERICA 210

British Territory

Position, physical features, climate, natural regions, international boundaries

Canada mineral wealth, forest industries, furs, agriculture, manufactures, main cities, communications, trade

Newfoundland

The United States mineral wealth, forest industries, agriculture, industry, chief towns, communications, trade of U S A

Mexico

West Indies

Atlas Study and Revision

EXERCISE 10

CHAPTER XI

SOUTH AMERICA 236

British Possessions

Position, physical features, climate, natural regions, communications, difficulties of development

Atlas Study and Revision

EXERCISE 11

ILLUSTRATIONS

FIG.	PAGE
1. Rotation of Earth; Day and Night	3
2. Revolution of Earth; the Seasons	4
3. Nature of Latitude	6
4. Nature of Longitude	7
5. Scale of 10 miles to 1 inch	8
6. Diagram of Area to show Triangulation	9
7. Compass Traverse Survey; Measurement of Angles	10
8. The Drawing of Contours	11
9. Sections of Contour (<i>a</i>) and (<i>b</i>)	12
10. Calculation of Annual Range from Monthly Iso- therms	15
11. Temperature Conditions of the World, July Iso- therms	16
12. Temperature Conditions of the World, January Isotherms	17
13. The Planetary Wind System	19
14. Position of the Main Winds during Summer of Northern Hemisphere	20
15. The Main Ocean Currents	27
16. Nature of Tides	28
17. Southampton's Four Tides Daily	29
18. (<i>a</i>) and (<i>b</i>). Section and Contoured Sketch of Upper River Valley	32
19. (<i>a</i>) and (<i>b</i>). Section and Contoured Sketch of Middle Valley	33
20. Meandering in Lower Valley of River and the Formation of Ox-bow Lake	34
21. (<i>a</i>) and (<i>b</i>). Crack Developing in Earth Surface	35
22. Block Mountain Formation	35
23. Rift Valley Formation	35

FIG		PAGE
24	Distribution of Climatic Types (Diagrammatic)	38
25	Distribution of the Hot Lands, Climatic Subdivisions	39
26	(a), (b), and (c) Planetary Wind System. Normal— Cool—Hot	45
27	Distribution of Warm Temperate Climatic Sub- divisions	48
28	Distribution of Cool Temperate Regions	51
29	Distribution of Wheat, Rice, and Maize	66
30.	Distribution of Tea, Coffee, and Cacao	72
31	Distribution of Cane and Sugar Beet	73
32	Main Coal-fields of Canada and the U S A.	80
33	Distribution of Main Coal-fields of Great Britain	91
34	Distribution of Main Coal-fields of Europe	92
35.	Other Mineral Wealth of North America	97
36	Movement of Coal and Iron Ore on the Great Lakes Waterway	103
37	Human Activities (Simplified)	107
38	Density of Population (Generalized)	109
39.	Position of Carlisle	112
40.	Position of Winnipeg	113
41.	Position of New York and Montreal	114
42	Position of Singapore	116
43	Main Navigable Rivers of Europe	121
44	Main Sea Routes of the Atlantic	127
45	Main Sea Routes of the Pacific	131
46	Main Sea Routes to the East	134
47	Main Empire Air Lines	138
48	Outstanding Physical Features of Asia	142
49.	January Rainfall and Winds of Asia	144
50.	July Rainfall and Winds of Asia	145
51.	Natural Regions of Asia	146
52	Route taken by Trans-Siberian Railway	151
53	Main Physical Features of India	152

FIG	PAGE
54. Distribution of Annual Rainfall in India . . .	154
55. Division of Pakistan and India . . .	158
56. Rainfall Conditions in Japan . . .	166
57. Chief Physical Features of Africa . . .	172
58A. Rainfall Conditions of Africa in July . . .	174
58B. Rainfall Conditions of Africa in January . . .	174
59. Distribution of Natural Regions in Africa . . .	176
60. The Nile Valley . . .	181
61. Most Important Railway Lines in Africa . . .	188
62. Chief Physical Features of Australia . . .	192
63A. Temperature and Wind Conditions of Australia in January . . .	193
63B. Temperature and Wind Conditions of Australia in July . . .	194
64. Annual Rainfall of Australia . . .	195
65. Natural Regions of Australia . . .	196
66. Chief Railway Lines of Australia . . .	202
67. Main Physical Features of North America . . .	211
68. Temperature Conditions in North America . . .	212
69A. January Rainfall in North America . . .	213
69B. July Rainfall in North America . . .	214
70. Natural Regions of North America . . .	216
71. Growth of Hydro-electric Power in Canada . . .	218
72. Main Trans-continental Railway Lines in North America . . .	223
73. Chief Agricultural Divisions of the U.S.A. . . .	226
74. Chief Physical Features of South America . . .	237
75A. Climatic Conditions of South America in January . . .	238
75B. Climatic Conditions of South America in July . . .	239
76. Natural Regions of South America . . .	241
77. Chief Communications of South America . . .	247
78. Main Physical Features of Europe . . .	253

FIG		PAGE
79A	Temperature and Rainfall Conditions of Europe in January	255
79B	Temperature and Rainfall Conditions of Europe in July	256
80	Annual Rainfall of Europe	257
81.	Natural Regions of Europe (Simplified).	258
82.	Outstanding Agricultural and Pastoral Activities of France	267
83	Power Resources, Industry, and Chief Ports of France	270
84	The Zones of Germany.	275
85	The Zones of Poland	280
86	Economic Features of European Russia	282
87	Position of the Alpine Passes	286
88	The Continental Railways of Europe	288
89	Density of Population in Europe	290
90	Build of the British Isles (Simplified)	294
91.	Physical Features of South-east England	300
92	Temperature Conditions of the British Isles	302
93	Annual Rainfall of the British Isles	303
94	Fishing Grounds and Ports of the British Isles	312
95	The Lancashire Cotton Industry	314
96	The Yorkshire Woollen Industry	317
97.	The Coal-fields of Scotland	320
98.	The Northumberland-Durham Coal-field Area	321
99	Coal-fields and Industrial Areas in the Midlands	322
100.	Density of Population in the British Isles	326
101.	Chief Canals of England	327
102.	Main Railway Lines of Great Britain Before Nationalization	330
103.	Positions of Belfast and of Dublin	333

INTRODUCTION

THROUGHOUT this book, I have kept in mind the limited time at your disposal, and the many calls upon that time. Thus I have eliminated all irrelevant material, for while such "padding" may help to make a subject more readable, it cannot help you to achieve your object—the passing of the examination. On the other hand, I may be accused of wasting your time by reiterating the main principles and fundamentals. I feel sure, however, that results will stress the value of this method. The acquisition of subject-matter and the ability to present it in the form required by the examiners constitute a dual aim for you, the achievement of which can be aided by observation of the following points.

1. Atlas Study

It is an oft-quoted witticism that "the geographer never knows where a place is, but if you tell him where it is, he'll tell you why it's there." Such geography is unbalanced, for a geographer should know where places are—and this knowledge can only be acquired by constant reference to an atlas. To aid you in locating places quickly, I have, in most cases, inserted the latitude and longitude figures in brackets. These figures need not, of course, be remembered, but are given merely for your convenience.

2. Illustration of Subject-matter

A very useful way of remembering the facts raised in the text is to start work with two or three traced blank maps of the region to be studied. All subject-matter and place-names can be inserted while the region is being studied. Then, as a test, the exercises marked "map study and revision" can be worked.

Throughout the book the diagrams and sketch maps drawn are such that you should be able to reproduce them,

at least roughly, in your examination. Beauty of line and craftsmanship are not required in the drawing of "illustrative" sketch maps and diagrams, although these should be as clear and neat as possible. The value of these "illustrations" lies in the fact that they "illustrate," i.e. they display in pictorial fashion the geographical factors raised in the text. Do not, therefore, burden your sketch maps with a mass of irrelevant details, but let them show, boldly, the main factors treated in your answer.

3. Answering of Questions

Success or failure depends upon what you do in the examination, and practice in answering questions is therefore necessary. The exercise and questions at the end of each chapter will provide the necessary material. The answering of such questions is often a weary business and the temptation to shirk may be great, but a learned friend of mine assures me that "*Strenuis Ardua Cedunt*" (Difficulties yield to those who work hard), and with this thought I leave you to pass on to Chapter I.

CHAPTER I

A. MATHEMATICAL GEOGRAPHY

THE earth experiences a twofold type of motion—

(a) **Rotation**—or spinning on its *own axis*. It is this motion which causes the phenomenon of Day and Night. A complication is introduced by the fact that the *axis of the earth is inclined*.

As shown in Fig. 1, the sun's rays illuminate one half of the world at any one time. The earth, however, is rotating

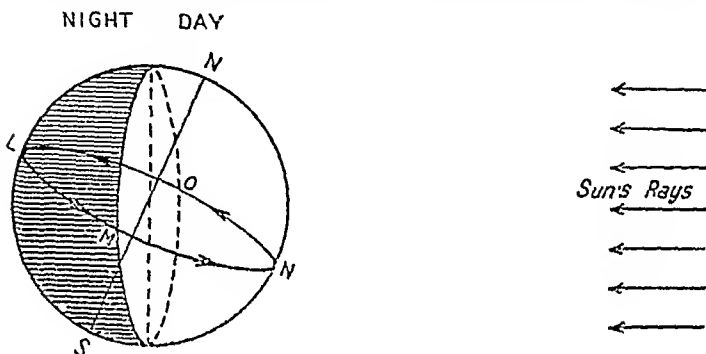


FIG 1 ROTATION OF EARTH; DAY AND NIGHT

on the axis (*N-S*) in the direction indicated by the arrows, the time for a total rotation being 24 hours. During this period then, points on the earth's surface, such as *L*, *M*, *N*, or *O*, for example, will pass into the path of the sun's rays (Day) and out of the sun's rays (Night).

N B. In the position of the earth as shown in Fig. 1, rotation of the earth along *N-S* results in the fact that the North Polar region (*N*) will experience a 24-hour day, and the South Polar region (*S*) a 24-hour night. Further, all regions in the Northern Hemisphere will experience longer days than nights; the reverse being true of the

Southern Hemisphere This is true during one of the seasons, which are caused by—

(b) **The Revolution of the Earth Round the Sun.** The earth moves round the sun, as indicated by path *ABCD* (Fig 2), in $365\frac{1}{4}$ days, and throughout this motion, the *axis is always inclined in the same direction*

Position *A* is the same as that given in Fig. 1 Note that the sun's rays are not directly overhead the central line *EE*

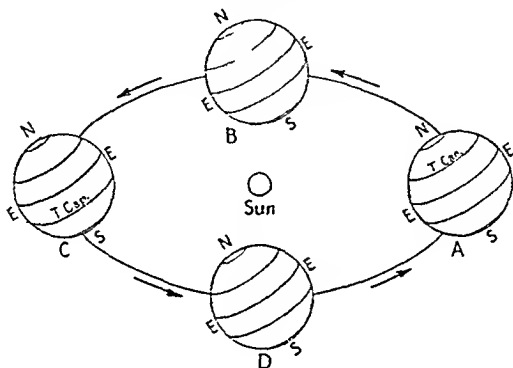


FIG 2 REVOLUTION OF EARTH, THE SEASONS

(the imaginary line known as the *Equator*), but overhead the line marked *T Can* (another imaginary line known as the *Tropic of Cancer*) This position of the earth with regard to the sun is known as the *summer solstice*. At *C* the position is reversed, and the sun is overhead along the line *T. Cap* (the *Tropic of Capricorn*) This is the *winter solstice* position At *B* and *D*, half-way between these two extremes, the sun is overhead at the *Equator*, and give the autumn and spring *equinoxes* respectively

Reverting now to *A*, the summer solstice position, and remembering the facts given under (a), it is seen that when the sun is overhead in the Northern Hemisphere, the days are longer than the nights, and, further, the higher position of the sun in the sky causes the warm summer season

During this period the Southern Hemisphere experiences winter. Note how the position is reversed in position *C*.

Further, note also that between *A* and *B* the effect of this movement of the earth results in the gradual change in the lines at which the sun's rays are overhead. During this period, then, it appears that the sun has moved south from the Tropic of Cancer to the Equator. Remembering that it is really the earth which is moving, use Fig. 2, while examining the following—

Summer in Northern Hemisphere

Solstice: 21st June

Season: 21st June–22nd September

Sun apparently moving from Tropic of Cancer to Equator.

Autumn in Northern Hemisphere

Equinox 22nd September.

Season: 22nd September–21st December.

Sun apparently moving from Equator to Tropic of Capricorn.

Winter in Northern Hemisphere

Solstice. 22nd December.

Season. 22nd December–20th March.

Sun apparently moving from Tropic of Capricorn to Equator

Spring in Northern Hemisphere

Equinox: 21st March

Season: 21st March–20th June.

Sun apparently moving from Equator to Tropic of Cancer.

Remember. The seasons are reversed in the Southern Hemisphere.

Latitude

Lines of latitude are merely conventional signs which help us to map the world systematically. Their measurement in degrees is due to the fact that they are determined as follows

In Fig 3 assume that the earth is split into halves from pole to pole. D represents a position on the surface, whereas O is the centre of the earth.

The angle DOB is called the *latitude* of the point D .

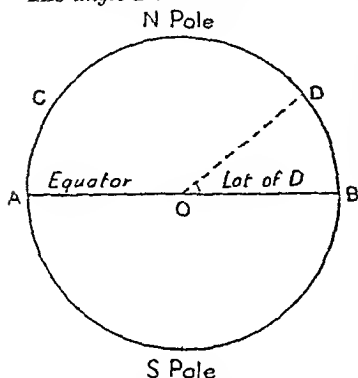


FIG 3 NATURE OF LATITUDE

The latitudes of many points on the earth's surface are found, and *lines of latitude* are lines joining up all points which give the same angular measurements.

The way in which lines of latitude are drawn varies considerably, for on the globe they are circular, whereas on atlas maps their portrayal ranges from straight lines to well-marked curves. This is due to the fact that it is

impossible to map a globe correctly on a flat surface.

IMPORTANT LINES OF LATITUDE

The most important lines of latitude are the *Equator* (0°), the *Tropics of Cancer* ($23\frac{1}{2}^\circ$ N.) and *Capricorn* ($23\frac{1}{2}^\circ$ S.), and the latitudes of 60° N. and 60° S. Study your atlas carefully, noting the countries through which they pass. (It would be a very useful exercise to mark them on a roughly drawn or traced map of the world. Proximity of large towns to these lines of latitude might also be noted, e.g. Karachi and Hong Kong are almost on the Tropic of Cancer, whereas Singapore is near the Equator. This knowledge would prevent mistakes in drawing a sketch map of South-east Asia.)

Longitude

Fig 4 represents a view of the earth with the North Pole as centre (The circumference, therefore, represents the Equator and the dotted circles represent lines of latitude.)

Lines of longitude are lines joining up the North and South Poles, and would thus, as indicated by NA , cut the lines of latitude and the Equator. One is taken as standard (0°), and the others drawn at suitable angles, e.g. BNA , to this standard.

Longitude represented by NB
 $=$ angle BNA .

As for latitude, and for the same reason, lines of longitude are represented on atlas maps in differing ways.

On your atlas note the line representing longitude 0° (which runs through Greenwich), and note that other longitude figures are given as being to the west and east of this line (up to 180° in each case).

Time

Study the top part of the diagram given in Fig. 4. At C the sun has reached its highest possible position in the sky, and C therefore experiences noon. Owing to the rotation of the earth (shown by arrow), D to the west of C , comes into C 's position later and will therefore experience *noon later*. If, however, two points are directly north and south of each other, i.e. on the same line of longitude, they will experience noon at the same time.

DIFFERENCES OF TIME BETWEEN LONGITUDE LINES

As shown above, regions east and west of one another will experience noon at different times. Thus throughout the whole day clock times will differ accordingly. The extent of these differences can be calculated from longitudinal measurements in the following manner.

During the daily rotation, each point on the earth's

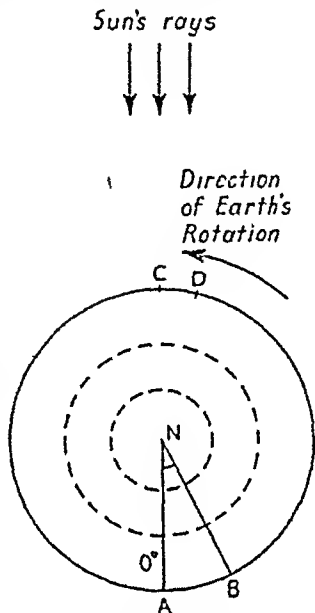


FIG 4 NATURE OF LONGITUDE

surface passes through 360° . Assume that C and D (Fig 4) are 10° apart. D passes through 360° in 24 hours, and will therefore pass through 10° in $\frac{24 \times 10}{360}$ hours, i.e. 40 minutes.

Thus D will experience noon 40 minutes later than C , and all clock times at D will normally be 40 minutes later than at C .

$N.B.$ 1° longitude corresponds to a time difference of 4 minutes.

Thus in working out problems on time, remember—

(a) Places north and south of each other experience the same time.

(b) A place to the east of a given point will have its "time" *earlier* than that point (4 minutes per degree longitude).

To prevent confusion, various areas take their time from a set line of longitude. Great Britain, for example, takes its time from Greenwich, which is on longitude 0° . In Europe there are two other standard times, viz. the Central European and the Eastern European.

Maps

(A) SCALES

A map scale is arranged to give an accurate representation of distance. Map scales are usually given in the following forms—

1. A certain number of miles on the ground can be represented by 1 inch on the map. For example, a map scale of 10 miles to 1 inch can be given as 1 inch = 10 miles, or as in Fig. 5.

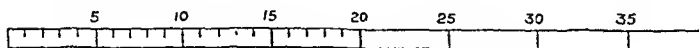


FIG. 5. SCALE OF 10 MILES TO 1 INCH

2. In representing 10 miles on the ground by 1 inch on the map the scale can also be expressed as a fraction—

$$10 \text{ miles} = 633,600 \text{ inches}$$

This 1 inch represents 633,600 inches, and the map scale can be given as $\frac{1}{633,600}$. (This is called the *Representative Fraction*.)

(B) MAPS OF SMALL AREAS

1. *Chain and Tape*. A simple map of a small area can be made quite simply by measurement of lengths, the instruments used being a chain and tape. A rough diagram of the area is drawn, and the corners and principal

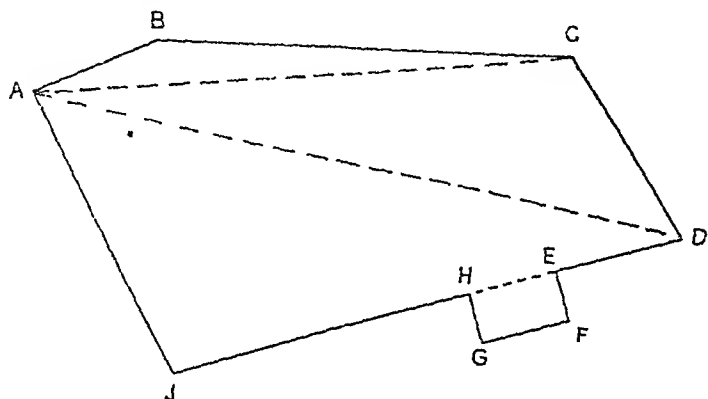


FIG. 6. DIAGRAM OF AREA TO SHOW TRIANGULATION

features are indicated by letters (e.g. *A, B, C, D, E, F, G, H, J* in Fig. 6) *AB, BC*, etc., thus represent the boundaries.

The rough plan is then divided up into large triangles, and if the actual ground distances of the sides are measured, each triangle can in turn be accurately drawn to scale. The finished drawing then comprises an accurate representation of the main boundaries.

For the measurement of a distance such as *AD*, which is not a line on the ground, difficulty is incurred in ensuring that the measurement is made in a straight line. To overcome this, one observer can remain at *A*, while his helper walks toward *D* placing poles (or ranging rods) as he goes.

By fixing his eyes on D , the observer at A can so direct that the ranging rods are placed in a straight line

For small irregularities, such as $EFGH$, the distances of F and G from the main line DJ are measured and drawn on the plan accordingly. Such subsidiary measurements are called "offsets."

(In reading the above, you must bear in mind that the example given is a very simple case—but the same principles apply no matter how difficult the area to be mapped.)

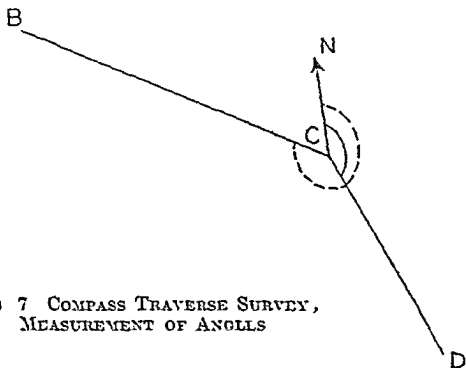


FIG 7 COMPASS TRAVERSE SURVEY,
MEASUREMENT OF ANGLES

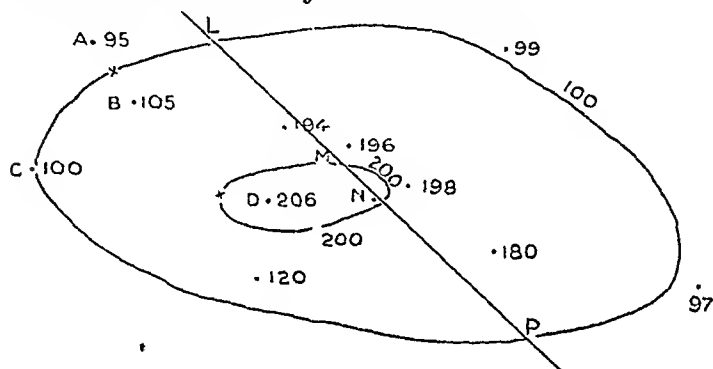
2 Compass Traverse The instruments used are a chain and tape for measurements of length, and a prismatic compass. This latter instrument measures, in a clockwise direction, the angle between the north direction and any line along which the prismatic compass is focused. Thus, when drawing the map the points are always plotted as so many degrees from north. Assume that the ground represented in Fig 6 is to be surveyed by this method.

The compass would be set up over C , set for north direction, and then swivelled until focused along CD . This gives obtuse angle NCD (shown in Fig 7). By swivelling the compass farther, and focusing it along CB , the obtuse angle NCB is measured.

Now the angle $BCD = \text{obtuse angle } NCB - \text{obtuse angle } NCD$. The distances BC and CD can then be measured,

and since the angle included between these lines (i.e. BCD) is known, the boundaries BC and CD can be mapped. By moving the compass to the other corners in turn all the boundaries can be drawn—and the map of the area completed *without leaving the boundaries*. (This method is of value when the chain and tape method is impossible.) This happens, for example, when corners C and D (see Fig. 6) are not visible from A .

As in the case of a chain and tape survey, small irregularities can be inserted by means of offsets.



Scale 1 inch to 1 Mile

FIG. 8. THE DRAWING OF CONTOURS

(C) REPRESENTATION OF RELIEF ON MAPS

Relief on maps is indicated mainly by the following mathematical methods—

(a) *Spot Heights*. Sometimes the height of a place above sea-level is actually printed, in figures, on the map. These are known as spot heights.

(b) *Contours*. A contour line is “a line drawn on a map joining up all places of the same height above sea-level.” The difference between contour lines is known as the contour “interval” and varies for different maps, the most common interval for large-scale maps is 50 ft. or 100 ft., and for smaller scale maps from 1000 ft. to 3000 ft.

To draw contour lines the spot heights of a number of observation stations must be plotted (see Fig. 8).

Consider observation stations *A* and *B*. *A* is 95 ft. and *B* 105 ft., thus it is reasonable to suppose that half-way between these stations occurs an altitude of 100 ft. (marked \times). If this is joined to another spot of similar altitude (e.g. *C*) we have part of the 100 ft. contour line.

Turning now to *B* (105 ft.) and *D* (206 ft.) it is again reasonable to suppose that an altitude of 200 ft. (marked $+$) occurs much nearer to *D* than to *B*.

By pursuing these principles the contour lines of 100 ft. and 200 ft. can be drawn (study Fig. 8 closely and note how

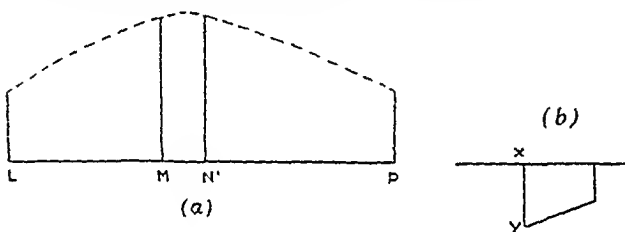


FIG. 9 SECTIONS OF CONTOUR (a) AND (b)

this has been done). In the example given, the contour interval is 100 ft.

Note. In many maps, the spaces between contour lines are tinted in various colours, giving a well-marked representation of relief. The physical maps in an atlas will give many examples of this method.

(c) *Gradients.* When contours are close, the indications are that there is a great difference in height over a short ground distance, i.e. there is here a relatively steep gradient. Similarly, widely spaced contours indicate more level stretches of ground.

(d) *Sections.* A section is a representation of the changes in altitude along a given line. Suppose that a section is required along *LP* (Fig. 8). Draw *L'P'* (Fig. 9 (a)) to represent *LP* on contoured sketch, and mark off *L'M'*, *M'N'*, and *N'P'* to represent *LM*, *MN*, and *NP* respectively.

Note that M and N are the places where the line of section cuts the contour lines

The altitude of each point LMN and P is represented by vertical lines, but note—

The scale of LP (see Fig 8) is 1 inch to 1 mile.

Thus, if we attempt to draw to this scale, a vertical line at L representing 100 ft., its length would be $\frac{1}{60}$ in.—too small for practical purposes. Thus the vertical scale is magnified, and in the instance quoted, if the scale is magnified 25 times, 100 ft. can be represented by $\frac{1}{2}$ in. M and N (each 200 ft.) are thus represented, on this increased scale, by 1 in.

You must try to adopt your vertical scale so that the vertical line of greatest length does not exceed 1 in.

The section is completed by joining up these altitude representations as indicated in Fig 9 (a).

N.B. In drawing sections under water, draw the vertical lines in the opposite direction, i.e. below LP (see XY in Fig. 9 (b)).

B. THE ATMOSPHERE

Temperature

This is measured by various types of thermometers and represented by various scales. The one most commonly used in geography is the Fahrenheit scale, which takes 32° F. (i.e. 32 degrees Fahrenheit) as the melting point of ice, and 212° F. as the boiling point of water. Throughout this book all temperature figures given will be on this scale.

The chief type of thermometer used in recording readings is the maximum and minimum thermometer which, as the terms imply, records the highest and lowest temperatures recorded daily at the observation station at which the instrument is set up. The average of these two readings is referred to as the *mean* for the day in question. The difference between the maximum and minimum for the day is called the *daily range*.

When recordings are kept over a continuous period, the following can be worked out from the daily readings—

(a) *Monthly average temperature*, i.e. the average for the mean daily temperatures for the month in question.

(b) *Annual range*, i.e. the average difference between the monthly averages for the hottest and coldest months (usually December and January) To ascertain this, records must be kept for a large number of years

SPECIAL CIRCUMSTANCES

(a) Water requires more heat than land does to raise the temperature of the air above it through 1° , hence the air above bodies of water experiences smaller temperature ranges than that over land masses. This fact, that the atmosphere above water is slow to alter in temperature, exercises a modifying influence on the climate of adjacent land regions

(b) Temperature decreases with altitude, the usual drop in temperature being about 1° F. per 300 ft. For recording and representing purposes, however, all temperatures are reduced to a "sea-level equivalent," i.e. we calculate what the temperature would be if the station were at sea-level.

E.g. the average July temperature at summit of Scawfell = 29° F.

Altitude of Scawfell = 3220 ft

Allowing 1° F / 300 ft the decrease in temperature

$$= \frac{3220}{300} = 10.7^{\circ} \text{ F.}$$

\therefore If Scawfell were at sea-level the temperature would be $(29 + 10.7)^{\circ}$ F, i.e. the sea-level equivalent of Scawfell's temperature is 39.7° F

ISOTHERMS

An isotherm is a line joining all places having the same temperatures (reduced to sea-level) at the same time. They are also widely used to indicate—

(a) Daily means (i.e. this isotherm is a line drawn along all places having the same "daily mean")

(b) Monthly mean temperatures. The most common isotherms used in atlases are those for January and for July

(c) Yearly average temperature

Consider A (Fig. 10)

January temperature = 40° F.
 July temperature = 50° F.
 Annual range = 10° F. (A small range.)

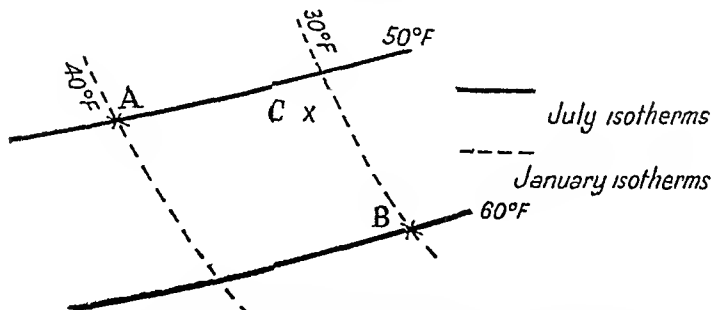


FIG 10 CALCULATION OF ANNUAL RANGE FROM MONTHLY ISOOTHERMS

Consider B

January temperature = 30° F.
 July temperature = 60° F.
 Annual range = 30° F (This is a fairly large range)

Consider C

January temperature—

Between 30° and 40° F., but much nearer to 30° F. than to 40° F. At a guess, say 32° F.

July temperature—

Between 50° F. and 60° F., but nearer to 50° F. than 60° F. At a guess, say 53° F.

Range = 21° F.

GENERAL WORLD CONDITIONS

In Figs. 11 and 12, examine the July and January isotherms of the world, and note the following—

(a) *July*. Northern summer, sun overhead near Tropic of Cancer. Temperature decreases generally from this region to the poles, but during this season the land masses are

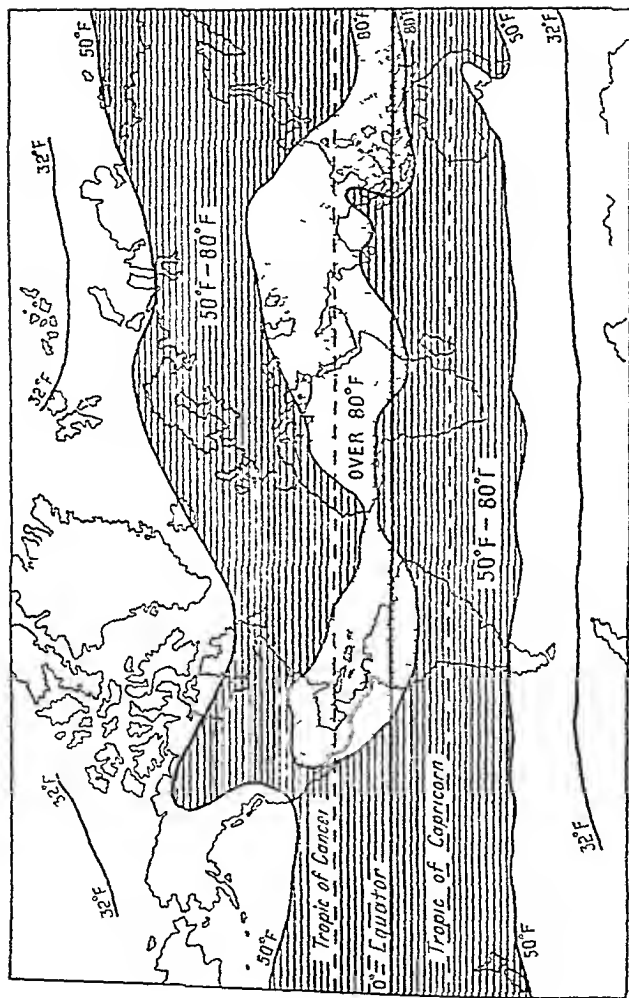


FIG. 11. TEMPERATURE CONDITIONS OF THE WORLD, JULY ISOTHERMS

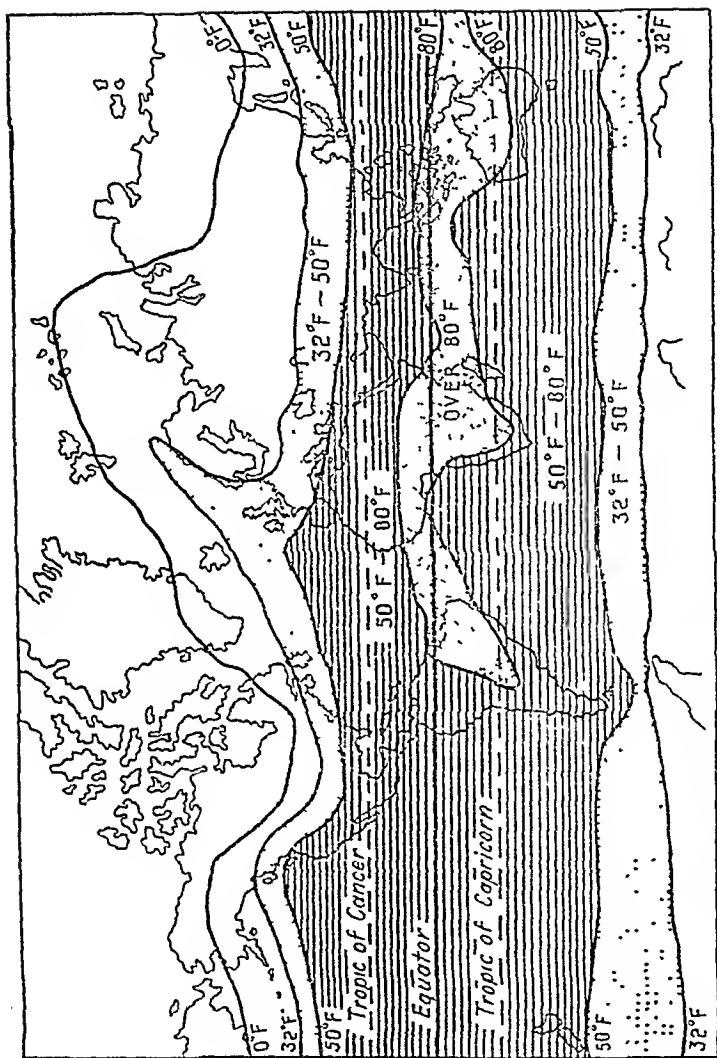


FIG. 12 TEMPERATURE CONDITIONS OF THE WORLD, JANUARY ISOTHERMS

warm compared with the sea, and isotherms bend northward over the land and southward over the sea

(b) *January* Northern winter, sun overhead near Tropic of Capricorn. Temperature decreases generally from region 0° – $27\frac{1}{2}^{\circ}$ S towards both poles, but owing to the difference in heating effects of land and sea areas, there are considerable modifications. In the Northern Hemisphere, for example, the land masses are cold compared with the sea, and thus the isotherms bend southward over the land and northward over the sea.

In the case of the Southern Hemisphere the same principles apply, but owing to the smaller proportion of land here, the above-mentioned characteristics of isotherms over land and sea are not so marked.

N.B. Over land masses the annual range increases with distance from the sea, and regions which experience a considerable range are said to possess a *continental* type of climate.

Prevalent Winds

From records kept over many years, it has been found that at any particular point on the earth's surface, winds blow mainly in one direction. Over the British Isles, for example, there is a *preponderance* of winds from a westerly or south-westerly direction, during the course of a year, and thus we state that the prevalent winds over the British Isles are *westerly* or *south-westerly*.

Taking the world as a whole, the prevalent wind belts can be grouped roughly into the zones as indicated in Fig 13 (known as the planetary wind system).

N.B. During the ensuing description, use Fig 13 and refer continually to a world map in your atlas.

BETWEEN THE TROPICS

Winds blow towards the Equator, but are deflected to the right in the Northern Hemisphere, and to the left in the Southern Hemisphere, thus producing the constant winds known as the North-east and South-east Trades respectively.

OUTSIDE THE TROPICS

Winds blow towards latitudes of roughly 60° N. and S. respectively, producing the South-westerlies in the Northern Hemisphere and the North-westerlies in the Southern Hemisphere. From polar regions there are out-blowing winds.

An easy way to remember the planetary wind system is by means of the following rule—

The prevalent winds blow away from the Tropics and the

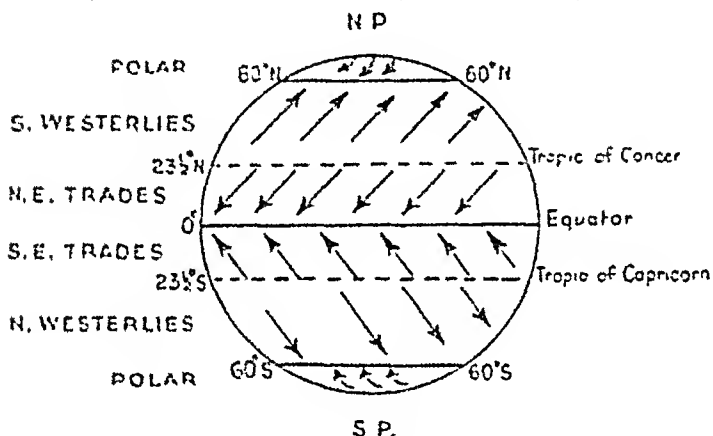


FIG. 13 THE PLANETARY WIND SYSTEM

Poles, with a right-hand deflection in the Northern Hemisphere, and a left-hand deflection in the Southern Hemisphere.

MODIFICATIONS TO THE PLANETARY WIND SYSTEM

(a) *The Apparent Movement of the Sun.* Earlier in this chapter it was explained that the sun's rays are overhead at the Tropic of Cancer on 21st June, and at the Tropic of Capricorn on 22nd December. This apparent movement of the sun modifies the planetary wind system, for the wind systems of the world move accordingly. During our summer the main wind belts move north, roughly to the position in Fig. 14.

From this diagram, study the following—

1 In the summer season of Northern Hemisphere, regions between latitudes 30° N and 45° N experience trade wind conditions

2. In the winter season of Southern Hemisphere, regions between latitudes 30° S and 45° S experience westerly wind conditions

In winter season of Northern Hemisphere the belts have

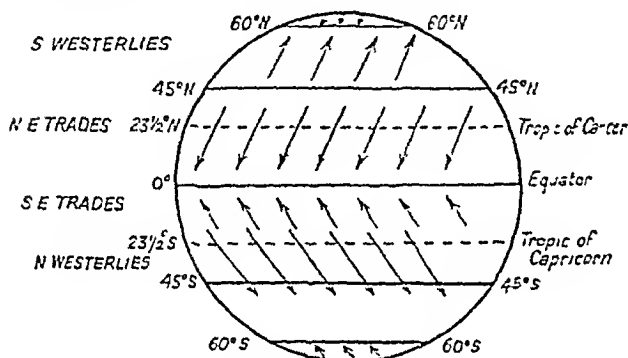


FIG 14 POSITION OF THE MAIN WINDS DURING SUMMER OF NORTHERN HEMISPHERE

moved south and the position is reversed, and we have the following—

3 In Northern Hemisphere Winter, regions between latitudes 30° N and 45° N. experience westerly wind conditions

4 In Southern Hemisphere Summer, regions between latitudes 30° S and 45° S experience trade wind conditions

The facts above must be clearly understood and remembered, or difficulties may arise in subsequent reading, particularly in the chapter on climatic regions

(b) *The Effect of Land Masses* As pointed out earlier in this chapter, the air over land masses is heated and

cooled much more readily than air over the sea, and it is owing to this fact that the distribution of our continents and oceans alter the planetary wind system considerably.

During the hot, or summer, season, the air over land masses is heated more than that over seas in the same latitude. Where this difference is well marked, winds blow from the land areas of cold air to those of warm air, i.e. winds blow inwards from the seas. During the cool, or winter season, the reverse is true—the sea has retained its heat, and the air above it is correspondingly warm, whereas over the land masses are centres of cold air. Where this difference is well marked, outblowing winds result.

The classic example of this modification to the planetary wind system is found in South-east Asia. During the warm season, when, according to Fig. 13, the North-east Trades should be in evidence, the air becomes greatly heated, and winds blow in from the Indian and Pacific oceans, resulting in the *Monsoon winds* (south-west in the case of India, south-east in the case of China and Japan).

During the cool season, the result of the differences in air temperature over land and sea is to produce outblowing winds—which tend to reinforce the normal trade wind systems.

N.B. Other examples of regions which experience this modification will occur later in your regional studies. Thus it is important that the principles outlined above should be clearly understood and remembered.

Precipitation

This occurs, in one form or another, when air, saturated with moisture, is cooled. Thus precipitation, either in the form of rain or snow, is caused in two main ways—

1. Moisture-laden air may be blown to colder regions.
2. Moisture-laden air may be forced to ascend.

The chief point to remember here is that temperature of air decreases with altitude.

From the diagram of the planetary wind belts (Fig. 13) you will see that the westerly wind systems blow away from the Equator, i.e. towards colder regions. This fact

helps to produce the precipitation which characterizes these winds as "rain-bearing"

The trade winds, on the other hand, are blowing to warmer climes and the tendency is towards dryness

A very good example of rainfall formed almost entirely by ascent of moisture-laden air into colder altitudes occurs in the equatorial regions. The rapid evaporation causes the light, moist air to rise, but cooling due to increase in altitude occurs, and precipitation takes place in the form of heavy rains. Thus are produced the *convectional rains* characteristic of the equatorial lands

Again, the presence of mountains or hill masses lying across the paths of moisture-laden winds causes the air to rise, and the consequent drop in temperature causes precipitation. The British Isles, in the path of the westerlies, illustrate this. In your atlas, note the heavy rainfall of the mountainous regions as compared with that of the plainlands to the east. The region on the leeward, i.e. the sheltered, side of a mountainous region experiences little rain and is thus in the "rain shadow" of the mountains

The Vale of York is a good example, for here the rainfall is under 25 inches annually, while the Pennine slopes of Lancashire, slightly to the west, experience over 40 inches annually

SNOW

Formed in colder regions or the upper air, and is really a crystalline form of water.

HAIL

Generally formed in the cold upper air, where the low temperature causes conversion of the water particles into ice

EXERCISE 1

- (1) Explain, with the aid of diagrams, the nature of:
 - (a) day and night; (b) the seasons
- (2) The time at Greenwich is 12 noon. What is the time at (a) Calcutta ($22^{\circ} 34' \text{ N. } 88^{\circ} 24' \text{ E.}$), (b) Rio de Janeiro

(23° S. 43° W.), and (c) Cullera (39° N. 0.0)° [22.34° = 22 degrees 34 minutes (60 minutes = 1 degree).]

(3) How would you proceed to map the boundaries of a small area such as a field?

(4) Use Figs 11 and 12, and calculate the approximate annual temperature range of each of the following. Cape-town (34° S. 18 30° E.), Para (1.28° S. 48 24° W.), and Glasgow (55.51° N. 4.16° W.).

(5) What do you understand by the term "Planetary Wind System"? Explain, as fully as you can, *one* modification of this system.

CHAPTER II

THE SURFACE OF THE WORLD

THE HYDROSPHERE

THIS is a term given to the expanses of water which cover the surface of much of the world. The greater part of the hydrosphere is comprised of the seas and oceans, which, when taken together, cover about 70 per cent of the surface.

The great land masses known as the continents, in general, maintain the slope of the land for some distance out to sea, giving rise to expanses of relatively shallow water. The part of the ocean floor covered by this shallow water (i.e. water to a depth of 100 fathoms) is known as the *continental shelf*. From the edge of the continental shelf, the sea floor slopes rapidly to the main bed of the ocean. This ocean floor maintains a general depth of 2000-3000 fathoms, but there occur small regions where the ocean is much deeper. The most famous of these "deeps," as they are called, is the Challenger Deep.

Distribution

On the atlas, study the distribution of the oceans and continents, noting especially the following points—

1 *The Antarctic* Continuous stretch of ocean in Southern Hemisphere, from which extend northward the Atlantic, Pacific, and Indian oceans.

2 *The Atlantic* Forms a continuous ocean stretching to the North Pole, but narrows considerably in two places—

(a) Between South America and Africa just north of the Equator.

(b) Between Canada and the British Isles.

There are two important points to notice here. One is the central position of the British Isles with regard to the land regions of the world. (This is brought out even more

Equator and is, therefore, a warm current. Along the shores of Western Europe the winds are mainly inshore, and thus the influence of the warm current penetrates inland, causing exceptionally mild weather for the latitude of Western Europe.

You may be requested to mark various ocean currents on maps, and hence the following must be very closely studied. Note especially the name, nature, and locality of the various currents.

EQUATORIAL CURRENTS

Occur in Atlantic, Pacific, and Indian Ocean, and flow from east to west. Near land masses these turn, and give rise to coastal currents.

The Atlantic Ocean

North Atlantic—

Warm currents	Gulf Stream and west wind drift North Equatorial
Cold currents	Labrador Canaries

South Atlantic—

Warm current	Brazilian
Cold current	Patagonian and Benguella

The Pacific Ocean Here the same general arrangement holds, and in this case the most important currents are—

Warm currents	Kuro Siwo—flowing along east of Japan and across to North-west America. East Australian
Cold currents	Californian, Kamohatka Antarctic and Peruvian

The Indian Ocean North of the Equator, the monsoonal changes cause changes in direction of currents. During the cool season (N.E. Monsoon), the N.E. current is in evidence, whereas during the hot and rainy seasons (S.W. Monsoon) water flows from the south-west.

The currents in the *South Indian Ocean* correspond to those of the Pacific and Atlantic—

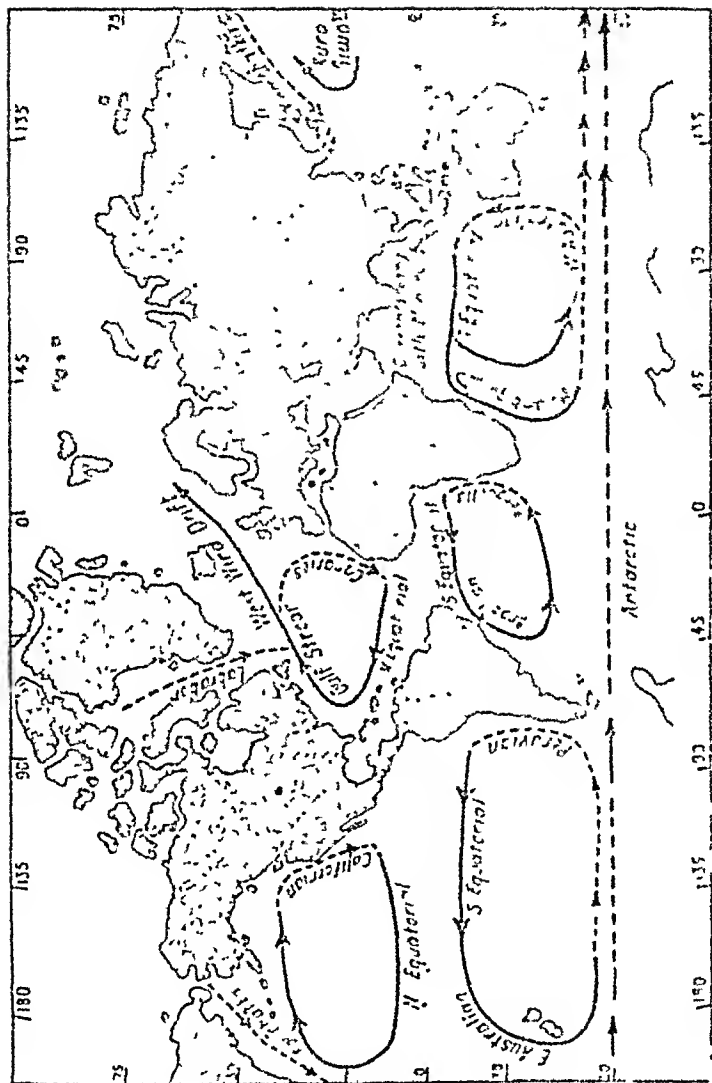


FIG. 15. THE MAJOR OCEAN CURRENTS

Warm current: Mozambique.

Cold current: Antarctic and West Australian

Tides

Twice daily the waters of the hydrosphere rise and fall a certain amount above and below their normal level

—motions which are referred to as the *tides*.

The causes are complex, and need not be fully considered. The chief general facts to be remembered are—

1 High tide at *A* corresponds to high tide at *C*—on the opposite side of the world.

2 Half-way between the regions of high tide occur those of low tide, i.e. *B* and *D*.

3 Owing to the relative motion of the earth and moon (one of the "causes"), the tidal waves move round the world.

The whole hydrosphere experiences two tides daily (i.e. high and low). The direction of the tidal motion is normally from east to west, but the presence of land masses across the path of the tidal wave modifies the actual direction considerably.

4 In any one locality the moon rises 45 minutes later than on the previous day, and thus high and low tides are correspondingly later.

5 *Spring and Neap Tides* The pull of the sun and moon are contributory causes to formation of tides. When both pull in the same direction, big tides, known as *Spring* tides, result, and when in opposition, much smaller tides are experienced. These are the *Neap* tides.

6 In the open ocean the difference between high and low tides is merely a few feet, but in shallow water, e.g. on the continental shelves, the rise and fall are considerable;

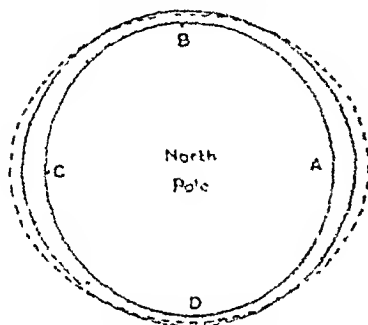


FIG 16 NATURE OF TIDES

and it is here that the tidal effects are of great importance. The flow of water which results from high and low tides in the estuaries and harbours is of value in that it helps to scour out sediment which would normally be deposited by the rivers. It is in almost tideless seas, such as the Eastern Mediterranean, that rivers are able to deposit sediment and form deltas (e.g. Nile). In narrow estuaries high tide comes in as a wall of water, known as a *bore*.

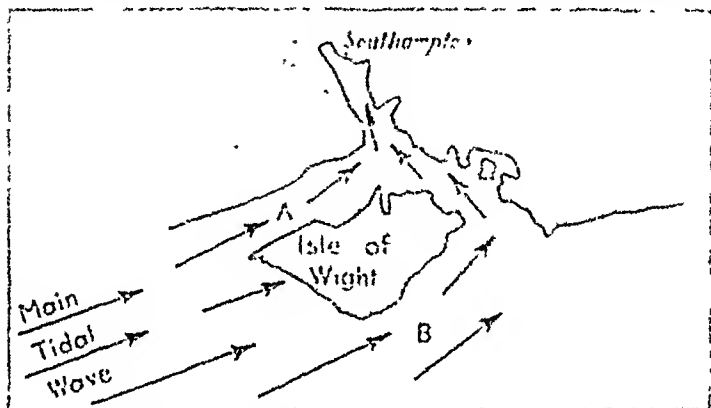


FIG. 17. SOUTHAMPTON'S FOUR TIDES DAILY

Such a phenomenon occurs on the River Severn. Another tidal phenomenon occurs in the case of the port of Southampton.

The main tidal wave (Fig. 17) is divided by the Isle of Wight into two (A and B). A causes high and low water at Southampton, and then, two hours later, in each case, B also causes high and low water. Southampton thus experiences four tides daily.

THE LITHOSPHERE

The solid outer crust of the earth is known as the lithosphere, part of which projects above the ocean level and thus forms the continents.

This surface of the earth is constantly being modified

by many agents, which may roughly be grouped as follows—

(a) Those originating on the surface of the earth or in the atmosphere, such as frost, rain, wind, rivers, and glaciers. The effect of these agents in course of time would be to reduce the surface of the earth to a gradually sloping plain.

(b) Those originating under the earth's crust, such as volcanoes, earthquakes, and mountain-building movements. These agents produce irregularities on the earth's surface, and offset to a certain extent the effect of the smoothing agents mentioned under (a).

The action of the "smoothing" agents falls under the three headings of Denudation, Transportation, and Deposition.

DENUDATION

This is the splitting up of the rocks and soils of the earth's surface into smaller particles. During the day, for example, heat from the sun causes rocks to expand, and the cooling influence of night causes contraction. This process, if continued, causes the rock structure to split up, and thus *the sun is an agent of denudation*. Frost acts in a somewhat similar way, for if the water in the crevices of a rock freezes, the force of the expansion which results causes the rock to break.

N.B. These two agents—sun and frost—are capable of denudation only and cannot move the material which they split up.

TRANSPORTATION

Other agents, such as the wind, rivers, and glaciers, can move material as well as break it up. This process of removing the material split up by denudation is referred to as transportation.

DEPOSITION

The material carried must eventually be deposited and it is evident that the agents of transportation are also agents of deposition. The agents capable of all three

processes of Denudation, Transportation, and Deposition are—

1. Glaciers
2. The Wind.
3. Rivers.

The action of the last two agents must now be considered more fully.

The Wind

This agent can pick up and carry particles of loose sand and soil, and when these moving particles strike irregularities in the path of the wind, they exercise a wearing—or denuding—effect. This action of the wind is particularly marked in desert regions. As a transporting agent, the wind is powerful, as eye-witnesses of sand storms will testify. Further, there is evidence that many large areas are covered with layers of wind-blown material. A good example of this occurs in North and North-west China, where thick beds of “loess,” which is a fine dust brought to its present position from considerable distances, are found. This illustrates the third action of the wind as a “smoothing” agent, for the loess has been *deposited* by the wind. On a much smaller scale, the deposition of wind-swept material is illustrated by sand dunes, which occur where an obstacle, such as a bush, hinders the free movement of the wind. The deposition of sand which results forms the dune.

Rivers

A river carries out all three processes. Denudation of the sides and bed of the stream is carried out by the small particles of solid material moved along by the water (cf. wind action). The water itself exercises a relatively weak denuding effect. The solid matter *transported* by the river is referred to as its *load*. For any river there is a limit to the load which can be carried. The amount of this load depends to a certain extent on the slope, and thus, in the upper reaches, a river rarely attains its maximum load; in other words, it can pick up and transport the material

denuded—and deposition is at a minimum. It is in the lower reaches of the river, where the land is flatter, that deposition is found. It is not, however, until the river reaches the sea that deposition of the bulk of the load takes place. If the river-mouth is tidal, this sediment is swept away, but where this is not the case the load is deposited in the form of a delta. Large deltas occur at the mouths of the Nile and Mississippi, to mention but two examples.

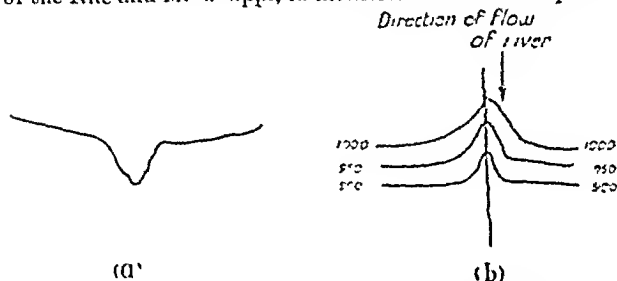


FIG 18 (a) AND (b) SECTION AND CONTOURED SKETCH OF UPPER RIVER VALLEY

In summing up, the following facts stand out—

- (a) In the upper reaches of a river valley—mainly denudation
- (b) In the middle reaches—mainly transportation.
- (c) In the lower course and river-mouth—mainly deposition

CHARACTERISTICS OF RIVER VALLEYS

(a) *The Upper Valley* The river is swift, and denudation of the bed of the stream is greater than that of the sides. Hence here the river cuts downwards, and tends to produce a gorge-shaped valley. Other agencies, however, such as frost and running water (after rains) wear away the sides; and the total result is a narrow V-shaped valley. This is shown in Fig 18 (a) and (b)

N.B. The gorge-like valley of the upper valley is illustrated by the sharp bends in contour lines

(b) *The Middle Valley.* Here the river has a considerable

load, and the decreased slope results in the fact that denudation of the *bed* is not so great as in the upper valley, while the wearing away of the *sides* still goes on. Thus is produced the smoother valley as indicated in Fig. 19.

(c) *The Lower Valley*. Here the river, with a maximum load, pursues its sluggish way across the plain. The decreased denuding and transporting power is shown in the fact that the river prefers to circumvent irregularities

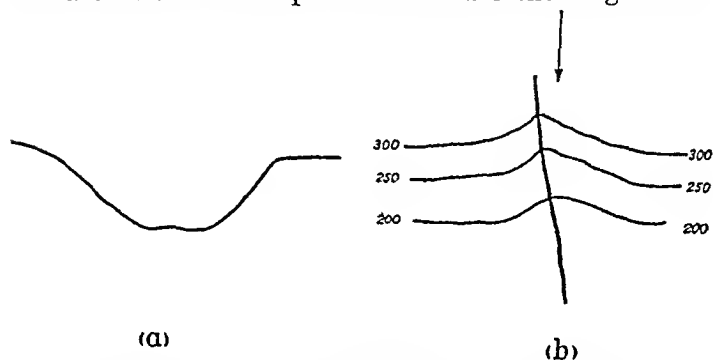


FIG 19 (a) AND (b) SECTION AND CONTOURED SKETCH OF MIDDLE VALLEY

on the surface, thus producing a small meander. When this happens the river accentuates the meander by wearing away material from one bank and depositing it on the other.

At *A* and *D* (Fig. 20) the force of the stream is directed towards one bank, which is worn away. The river has a maximum load, and thus the material picked up at *A* and *D* must be counterbalanced by deposition elsewhere. This happens where the water is sluggish, i.e. at *B* and *C*.

Where a meander has, by this means, become exaggerated, the river may cut through the narrowest part, and thus leave the lake illustrated on the right of Fig. 20. This type is referred to as an *ox-bow lake*.

THE RIVER BASIN

This is the term used to denote the whole of the area drained by a river and its tributaries. The dividing line between two river basins, usually a range of hills, is known

as the *watershed*. The Pennine range is a good example of a watershed, dividing rivers flowing east into the North Sea and those flowing west into the Irish Sea.

Land Forms

As indicated previously, forces under the earth's crust produce irregularities on the surface, and it is with these irregularities that we have now to deal.

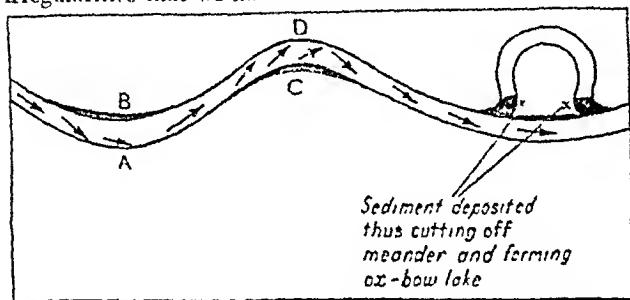


FIG. 20 MEANDERING IN LOWER VALLEY OF RIVER AND THE FORMATION OF OX-BOW LAKE

(a) FOLD MOUNTAINS

This type is caused by earth movements on a large scale, and forms by far the most important group of mountains.

The great fold mountain chains of the world are clearly marked on atlases. They comprise the Alpine ranges in Europe, the Himalayas in Asia, the Rockies in North America, and the Andes of South America. These are all lines of weakness in the earth's crust, and it is near to these regions that the major earthquakes and volcanoes of the world occur.

(b) BLOCK MOUNTAINS

Sometimes the forces under the earth's crust are shown by a series of cracks in the surface and the lowering of a considerable area. Such a crack is known as a *fault*.

If two faults occur as shown in Fig. 22, the land left upstanding is referred to as a *block mountain*.

The Thuringerwald, the Hartz Mountains, the Black

level of the land to a gradual sloping plain. Owing to the forces under the earth's crust, this planing process is never carried out over the whole of the earth's surface. If, however, comparatively small areas are left undisturbed by earth forces for a considerable period, the surface can be worn down until it is "almost a plain." The region is then referred to as a *peneplain*. East Sweden is a good example.

(c) PLATEAUX

Earth movements can raise large areas of flat lands or peneplains to a considerable height without folding, and when this occurs the stretch of high, yet level, land is referred to as a plateau. Examples often occur between mountain ranges, such as the inter-montane plateaux of the Rockies, Tibet, Central Switzerland, and much of Central Spain.

EXERCISE 2

(1) On a roughly traced map of the world, mark the Gulf Stream, Kuro Siwo, and the following currents. Labrador, California, Kamohatka, Patagoman, Mozambique, and Brazilian. Indicate the direction of their movement by means of arrows, and print "w" on warm currents and "c" on cold currents.

(2) What do you understand by the terms "spring tide," "neap tide," and a "tidal bore"? Explain why Southampton has four tides daily.

(3) Draw a contoured sketch of an area 6 miles by 4 miles to show the following features—

(a) A seashore toward the south-east

(b) A hill, 200 ft high, toward the north-west, from which a stream flows down to the sea.

(c) Two tributaries to this river—one on each bank.

[Scale 1 inch to 1 mile]

(4) Describe, and illustrate by means of sketch maps, the characteristics of a river valley throughout its length. What determines whether the mouth shall be characterized by (a) a deep estuary clear of sediment, or (b) a delta?

CHAPTER III

THE CHIEF CLIMATIC REGIONS

WHILE it is unusual for two regions to experience the same climatic figures in every respect, there are many large areas, often separated by great distances, which experience the same *type* of climate. For example, the Mediterranean lands of Europe, California and Central Chile all have the following characteristics—

1. They lie on the western sides of continents in the same latitudes (30° – 45°).
2. Temperatures range roughly from 50° F. in the coldest month to 70° F. in the warmest month.
3. Annual rainfall of about 20–30 inches. A well-marked characteristic in this connexion is that the summer season is very dry, and thus the maximum rainfall falls during the winter. In each case, the reason for this fact is the same, viz. owing to the shifting of the wind belts, the regions lie in the dry trade wind belt in summer and in the rainy westerly wind belt (rain bearing) in winter.

Further, these similarities in climate produce similarities in vegetation and human activity. Thus the regions considered are sufficiently alike in position and climatic characteristics to be grouped together as a *climatic type*—or *natural region*. The type here used as an example will be treated more fully later under the heading of “Mediterranean type.”

Professor Herbertson grouped the climatic regions of the world into five main types, with subdivisions of the first three—

(A) HOT LANDS.

- Subdivided into:
- (1) Equatorial Lowlands.
 - (2) The Sudan Type (Interior Tropical)
 - (3) The Sahara (Hot Desert) Type.
 - (4) The Monsoon Type.

(B) WARM TEMPERATE.

- Subdivided into:
- (1) West Marginal (Mediterranean).
 - (2) East Marginal.
 - (3) Interior Lowlands.
 - (4) Interior Highlands

(C) COOL TEMPERATE

Subdivided into: (1) West Marginal.
 (2) East Marginal
 (3) Interior Lowlands.
 (4) Interior Highlands.

(D) COLD TEMPERATE**(E) TUNDRA AND ICE CAP.**

Fig. 24 indicates roughly the distribution of these climatic types. You must bear in mind, however, that

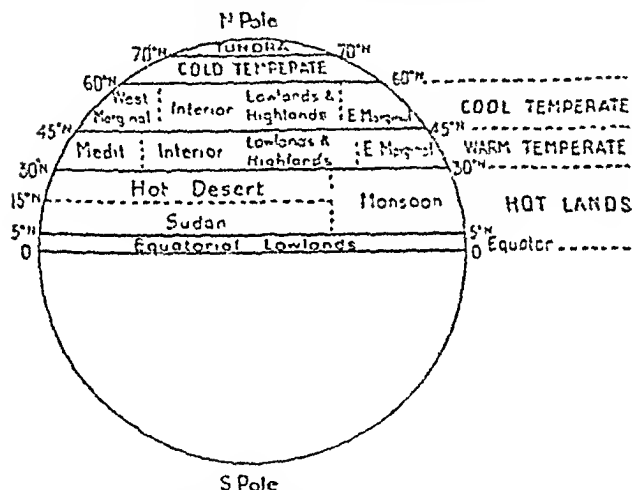


FIG. 24 DISTRIBUTION OF CLIMATIC TYPES (DIAGRAMMATIC)

The distribution for the South in Hemisphere is similar but, since land masses are not found south of 60° S, there are no examples here of cold temperate or Tundra

such types are not bounded by lines, for they gradually merge from one type into the other. Again, many factors, such as altitude, distributions of land and sea, and ocean currents cause modifications. Thus, Fig. 24 is necessarily *diagrammatic*. If, however, it is used in conjunction with the atlas during the rest of this chapter, it will be found of

great value in helping to fix the location of the types discussed.

N.B. (a) In the following treatment of climatic regions, the climatic figures of temperature and rainfall are characteristic and do not necessarily refer to any particular spot unless otherwise stated. Again they usually relate to those regions situated within the

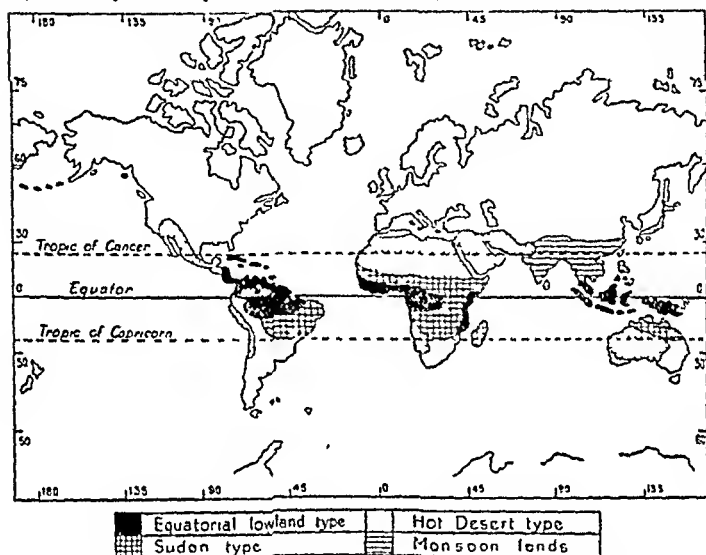


FIG. 25. DISTRIBUTION OF THE HOT LANDS, CLIMATIC SUBDIVISIONS

Northern Hemisphere In the Southern Hemisphere the seasons are reversed.

(b) Further, the human activities considered will be those which reflect the influence of climate and will take no account of mineral wealth. The distribution and results of mineral wealth will be dealt with in Chapter V.

(A) THE HOT LANDS

The characteristics of the hot lands, which lie roughly between latitudes 0° and 30° north and south of the Equator, are controlled by the seasonal movement of the sun. In general, it may be said that "the rain follows the sun," but apart from these common factors there are great

differences and the main region is divided into the subdivisions.

1. The Equatorial Lowlands

GENERAL POSITION

About 0° and 5° N and S of the Equator.

CHIEF REGIONS

The Amazon basin of South America, Congo basin and Guinea coast of Africa, and the East Indies

CLIMATE

Temperature High all the year round, i.e. very small monthly seasonal ranges

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec.	Range
80° F	80° F	80° F	81° F	81° F	82° F	82° F	84° F	82° F	82° F	80° F	79° F	5° F

Rainfall Very heavy rain all the year round. The rainfall is "convectonal" in type, and there is a slight increase during the two periods when the sun is almost overhead, i.e. at the equinoxes

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
80"	87"	62"	61"	60"	63"	64"	79"	91"	82"	67"	64"	861"

NATURAL VEGETATION

The natural vegetation is dense forest. There is among the plant growth of these regions a fierce competition for sunlight, and the dense interlocked foliage of the trees prevents the rays of the sun from reaching the ground. Creeping plants and parasites are common, and the undergrowth forms a veritable forest in itself. Evaporation from the surface is relatively slow, and these areas are usually badly drained.

Monkeys, jaguars, and leopards, all of whom are good tree climbers, are common species of animals. Other dwellers of the forest are wild pigs, crocodiles, and snakes

HUMAN ACTIVITIES

Native activities are usually confined to hunting and fishing, although in cleared regions agriculture has for centuries been carried out by primitive methods.

The interest shown by white men in these regions is chiefly confined to exploitation of the valuable forest products. The chief of these products are rubber, oil palm, and valuable hardwoods such as ebony and mahogany. Generally speaking, little is yet known, owing to the difficulties of penetration, of the resources of the equatorial regions.

In parts of the East Indies (especially Java) and the Malay Peninsula, the forests have been partly cleared and the land cultivated, usually on the plantation system. The chief crops produced are rubber, sugar, tobacco, coffee, and tea. Spices are obtained from the forests themselves, and, together with the cultivated crops, are exported.

2. The Sudan Type or Interior Tropical

GENERAL POSITION

Between latitudes 5° and 15° north and south of the Equator. Usually in the centre of the continent.

CHIEF REGIONS

Africa. The Sudan and much of Angola and Northern Rhodesia. Although nearer the Equator, the high altitude of the plateaux of Tanganyika produces climate and vegetation akin to the Sudan, and is, therefore, included under this type.

South America. North Brazil (outside the Amazon valley), the Guinea Highlands and Orinoco valley, and much of Colombia and Ecuador.

Northern Australia. Extending south of latitude 18° to the Great Deserts.

CLIMATE

This type is transitional between the equatorial regions, which have heavy convectional rain all the year round, and the deserts, which have little rain. In the summer season, when the sun is apparently moving to its position

overhead at the tropic, the equatorial rains also move to correspond—but only to a latitude of about 15° from the Equator (“Rains follow the sun”). During the winter season, the sun is overhead at the opposite tropic, and as climatic belts have also moved to correspond, the Sudan type experiences the N.E. Trades (dry). Summer rains and winter drought, then, are characteristics of this type.

As these regions lie between the Equator and the Tropics, the sun is overhead twice in the course of a year, and produces a “double maxima” of temperature, i.e. two periods of intense heat. These periods are also generally accompanied by increased rainfall, i.e. there is a “double maxima” of rainfall. The actual amounts of rainfall vary from 25 inches in that part of the region nearest the Equator to 10 inches on the desert side.

VEGETATION

Where the rainfall is over 20 inches trees can grow, and the natural vegetation consists of scattered trees and stretches of grassland—a typical parkland known as savanna. Farther from the Equator, where the rainfall decreases, this savanna gives place to open grassland, and eventually to the thorny scrubs of the desert margin.

HUMAN ACTIVITIES

The natural grassland produces animals such as the zebra, buffalo, antelope, and giraffe, and the natives of these regions engage in hunting. The keeping of cattle and primitive agriculture provide other means of sustenance, but these tropical grasslands have not been fully developed. The keeping of cattle on a considerable scale is increasing in these regions, and this activity may possibly become of even greater importance in the future, for the temperate grasslands are being given over more and more to arable agriculture.

3. The Sahara (Tropical Desert)

GENERAL POSITION

15° – 30° north and south of the Equator—on the western side of the continents

CHIEF REGIONS

The Sahara and Arabian Deserts, the Kalahari Desert (South Africa), Colorado, West Central Mexico and Lower California (North America); North Chile and West Bohvia (South America), and Western Australia.

CLIMATE

The trade winds are the prevalent winds in these regions, having blown in every case over extensive land masses, they are dry. Drought is the natural result, and the average rainfall is under 10 inches. The absence of moisture in the air allows the sun to beat down fiercely by day, and also allows escape of heat from the surface by night. Both daily and annual ranges of temperature are great.

TEMPERATURE AND RAINFALL

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Range
58° F	63° F	67° F	72° F	79° F	86° F	92° F	84° F	76° F	70° F	66° F	61° F	34° F Total
0 0"	0 0"	0 0"	0 0"	0 6"	1 0"	0 6"	0 3"	0 1"	0 1"	0 1"	0 0"	2 8"

VEGETATION

Except in hollows or the river courses (in many of which water flows only after rain showers) the sparse vegetation consists only of thorny scrubs. On the edges of the desert, coarse grass is found.

HUMAN ACTIVITIES

In the better watered parts, sheep and goats can feed on the coarse grass, and with their keepers lead a nomadic existence in search of pastures new. Human activity is, however, chiefly confined to the oases and wells. In the oases, and where irrigation can be practised from the wells or rivers, the date palm flourishes, sheep and goats are kept, and agriculture is carried on. These centres are the only areas of permanent settlement in the desert.

4. The Monsoon Type

CHIEF REGIONS

South-east Asia, comprising India, Indo-China, and South China; North-west Australia

CLIMATE

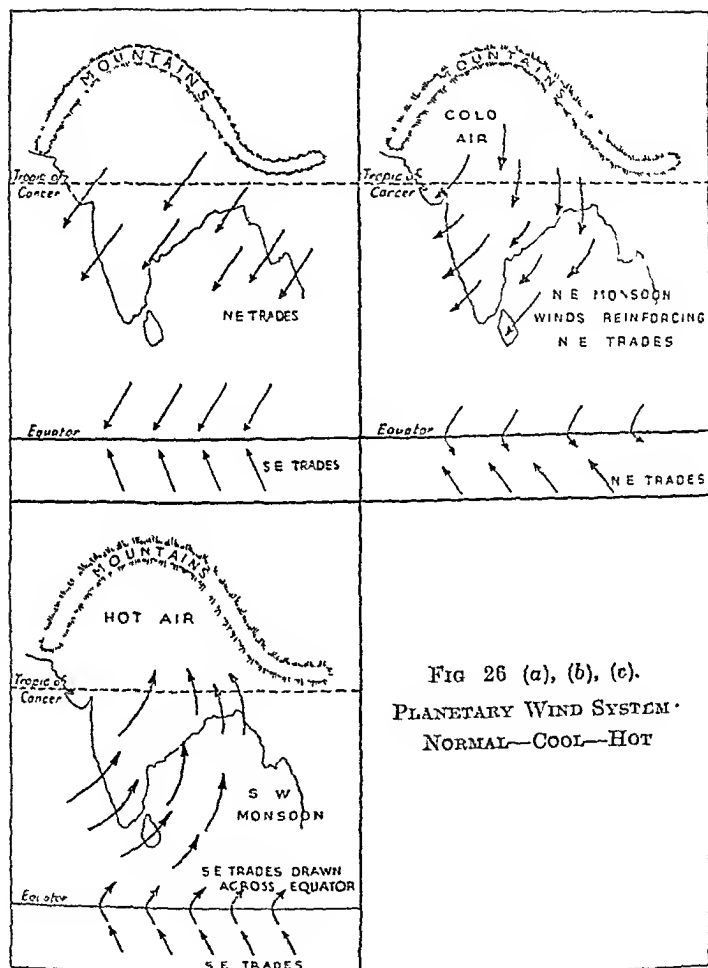
As in the case of the Sudan, this type is characterized by a dry, cool (or winter) season and a wet, hot (or summer) season, but the causes are different. In the cold season when the sun is overhead in the opposite hemisphere, the differences in the heating of land and sea cause *outblowing winds*, which reinforce to some extent the normal trade winds in this latitude. In the hot season when the sun is overhead in the same hemisphere, the heated air over the land causes *inblowing winds*—a complete reversal of the normal winds. Further, so strong is the power of the heated air that the trade winds from the opposite side of the Equator are drawn across and help to reinforce the inblowing winds. When this happens, the region experiences a monsoon type of climate. Bear in mind, then, that the term *monsoon* refers to a *wind system only*. India is a typical monsoon country, and a study of Figs 26 (a), (b), and (c) will help you to understand the changes of wind directions more fully.

Temperature The nature of the temperature conditions is indicated by the following characteristic figures—

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec.	Range
66° F	71° F	76° F	81° F	86° F	87° F	81° F	81° F	75° F	71° F	69° F	66° F	21° F

Rainfall During the cool season (October–March in the Northern Hemisphere) the region experiences the N.E. Trades which normally bring dry conditions (*N.B.* These trade winds bring rain to the south-east coast of India and Indo-China, for here they have blown over expanses of sea.)

During April and May, the land is being heated and the trades die away, still, sultry air makes conditions very oppressive. During June the S.W. Monsoon sets in, and heavy rainfall follows. In the coastal regions the annual



rainfall is about 80 inches, but this figure decreases with distance inland. For a coastal situation the following figures are typical—

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
0.2"	0.5"	1.1"	2.7"	4"	6.6"	15.8"	16.7"	15.1"	5.7"	0.7"	0.1"	75.7"

NATURAL VEGETATION

Where the rainfall is greater than 40 inches, forest growth is the normal vegetation cover. The trees of these monsoon forests lose their leaves during the hot season, and thus protect themselves against excessive loss of moisture by evaporation—a good example of the way in which vegetation meets the difficulties arising from the climatic conditions. The bamboo, sal, and teak are all valuable monsoon forest woods.

Inland, the decreasing rainfall causes the forest to be replaced by thorny plants and scrubs, and eventually, where the rainfall is less than 10 inches, desert conditions prevail. The Thar Desert in North-west India may be quoted as an example.

HUMAN ACTIVITIES

Man in the monsoon lands is essentially an agriculturist, for under such favourable climatic conditions a little labour is plentifully repaid. Where the rainfall is greater than 40 inches, the monsoon trees have been cleared over considerable areas, and crops such as rice and sugar are widely grown. In some regions, many crops of rice can be taken from the same patch of land in the course of a year. The mango, bananas, plantains, and breadfruit are valuable foodstuffs also produced here.

Where rainfall is below 40 inches the chief crops are maize, cotton, wheat (grown under irrigation during the cool season), millet, and beans, tea and coffee are produced on the hill-sides.

With such a wealth of agricultural possibilities it is not surprising to find that the monsoon regions are very thickly populated. This is particularly so in those areas producing

rice, which forms the staple food in all monsoon regions with a rainfall of more than 40 inches.

(B) THE WARM TEMPERATE LANDS

In general, this type is found within the lines of latitude 30° - 15° north and south of the Equator. Great climatic differences are found within the main type, which must, therefore, be subdivided

1. The Mediterranean Type

This is the type given as an example of a "climatic region" at the beginning of this chapter.

GENERAL POSITION

30° - 15° north and south of the Equator—on the western side of continents.

CHIEF REGIONS

The countries bordering the Mediterranean Sea, California, the south-west corner of the Union of South Africa, the south-west corner of Australia, and Central Chile.

CLIMATE

This type of region occupies a transition belt on the planetary wind system, for the movement of wind belts (following the sun) causes this type to be within the *west wind belt* in winter, and the *trade wind belt* in summer.

Temperature. Mild winters and warm summers are here the result of the low latitudes. Near the coast, all the "Mediterranean" regions are bathed by cold ocean currents, and in the winter season, when the winds are on shore, the temperatures are lower than the average for the whole region. The nature of this average is indicated by the following figures—

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Range
71° F.	72° F.	74° F.	76° F.	78° F.	80° F.	82° F.	84° F.	86° F.	88° F.	90° F.	92° F.	21° F.

Rainfall. The average annual rainfall is about 25 inches, of which by far the greater part falls during the winter

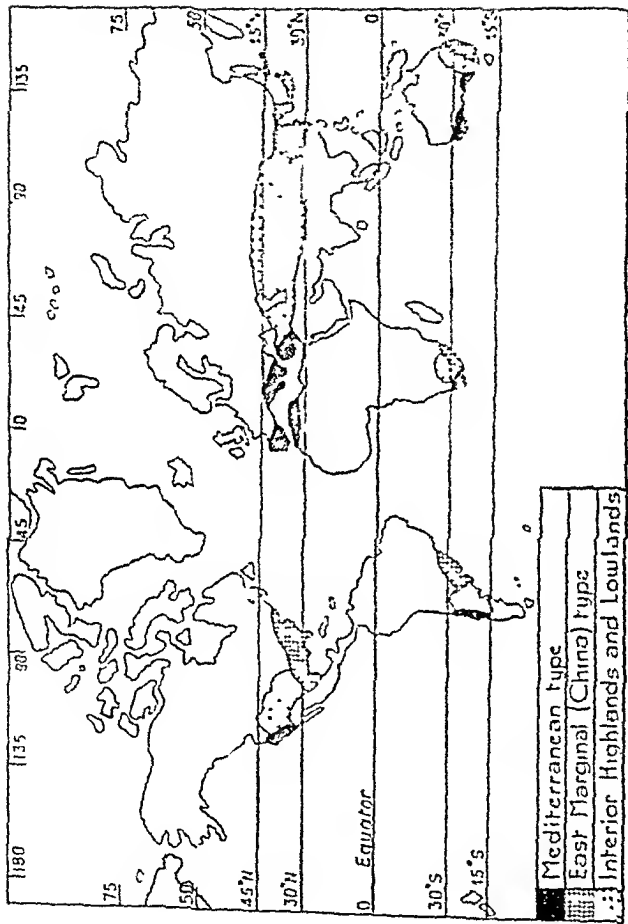


FIG. 27. DISTRIBUTION OF WARM TEMPERATURE CLIMATIC SUBDIVISIONS

season, when the westerly winds blow from sea to land. During the summer season, the N E. Trades, having blown over large land masses, are dry. The summer is, therefore, a time of drought

Jan	Feb	Mar.	April	May	June	July	Aug	Sept	Oct.	Nov.	Dec	Total
51°	52°	46°	30°	07°	00°	00°	01°	01°	02°	06°	28°	225°

NATURAL VEGETATION

Owing to the lack of rain in summer, the vegetation is adapted by nature to withstand drought. The shrubs and trees characteristic of this type of climate possess small leathery leaves able to withstand evaporation and long roots able to search deeply for moisture in the soil. Examples of such vegetation types are the cork oak, olive, orange, lemon, chestnut, and mulberry.

HUMAN ACTIVITIES

In this climate a little labour by man yields an abundant harvest, and this climatic type usually produces a well-developed and progressive area. Agriculture in one form or another is the chief activity of the bulk of the people.

In the first instance fruit is of great importance, and all Mediterranean regions produce and, generally, export oranges, lemons, grapes, olives, and apricots. The vine is used chiefly in wine manufacture, or, as in the case of Greece, in the production of currants.

Cereals, such as wheat and barley, are produced mainly in the low-lying regions, often as winter crops. Rice, cotton, and lucerne are other crops of value, and are usually produced where irrigation is possible. Sheep and goats are reared, and allowed to browse over land unfit for cultivation, e.g. on the slopes of the mountains.

The industrial activity carried on in Mediterranean regions is chiefly concerned with the preparation of agricultural products for export. Wine and jam making, canning of fruit, and silk manufacture (which is dependent on mulberry leaves for feeding the silkworms) are common industries.

2. East Marginal ("China" Type)

GENERAL POSITION

Roughly 30°-45° north and south of the Equator—on the eastern side of the continents

CHIEF REGIONS

China and Japan, South-east U.S.A., the south-eastern corner of the Union of South Africa, South Queensland and Eastern New South Wales, Uruguay, and North-east Argentina

CLIMATE

This is again a transition belt on the planetary wind system, but the climate results mainly from the unequal heating of land and sea. In summer the heated air over the land causes inblowing winds (i.e. from sea to land), whereas in winter the main winds blow outwards from the colder interior. Where the land mass is extensive, e.g. Asia, the interior is very cold indeed in winter, and the outblowing winds cause very low temperatures for a *Warm Temperate Type*.

Elsewhere the temperature conditions are not so extreme. In the following figures (A) indicates a station in East China, and (B) the average conditions of the other regions—

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec.	Range
(A)	38°F	41°F	48°F	53°F	65°F	71°F	78°F	80°F	74°F	60°F	51°F	40°F	42°F
(B)	49°F	53°F	55°F	59°F	61°F	67°F	74°F	76°F	71°F	62°F	57°F	50°F	27°F

Rainfall These regions experience rain at all seasons, but there is a *summer maximum*, for it is during this season that the winds are chiefly *onshore*. The annual rainfall, varying between 25 inches and 40 inches in the various regions, is greater than that of the Mediterranean type.

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
24"	25"	26"	21"	28"	39"	42"	43"	37"	29"	21"	19"	354"

NATURAL VEGETATION

This varies within the regions with increasing distance from the Equator; changing from evergreen tropical trees on the equatorial side to deciduous and coniferous trees on the poleward side. Characteristic trees are the camphor, bamboo, and eucalyptus.

HUMAN ACTIVITIES

Over much of the surface in these regions the forests are cut away; and the high summer temperatures and rainfall make agriculture possible. In the lower latitudes (i.e. south in the Northern Hemisphere and north in the Southern Hemisphere) the chief crops grown are maize, tobacco, cotton, rice, and the mulberry. Tea, on the higher hill-sides, is especially important in China. Towards the higher latitudes, wheat, millet, the soya bean, and sugar beet are more usual.

In the warmer parts of China and Japan, tropical and sub-tropical crops such as maize, cotton, and rice are grown in the summer, and temperate crops such as wheat, millet, barley, and oilseeds are grown on the same ground in the winter. This practice, known as double cropping, is necessary to support the dense populations of these regions.

3. The Interior Lowlands

GENERAL POSITION

30°-45° in the interior of land masses.

CHIEF REGIONS

Between longitude 100° W. and the Rockies in North America; the lowland region east of the Caspian, the Tarim basin and Mongolia, in Asia, West Argentina, extending to the Andes (South America); and Queensland and New South Wales west of the mountains (Australia).

CLIMATE

These regions, lying well inland, experience little modifying influence from the sea, and temperatures are generally more extreme than in the other subdivisions of the Warm

Temperate Type (North Central China excepted). Further, even when the warm air causes inblowing winds, these winds have travelled for considerable distances inland and bring but little moisture. These factors are borne out by the following figures—

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Range
Temperature	36° F	42° F	51° F	57° F	62° F	65° F	79° F	81° F	67° F	60° F	49° F	39° F	45° F
Rainfall	0.5"	0.7"	0.8"	1.9"	2.7"	3.0"	2.6"	2.5"	1.2"	0.9"	0.8"	0.2"	Total 17.8"

NATURAL VEGETATION

The rainfall of this region is generally insufficient for more than shrubs and coarse grasslands. In the Northern Hemisphere this vegetation merges northward into the cool temperate grasslands—the steppes and prairies. (See later)

HUMAN ACTIVITIES

Man in these areas has used the coarse grassland for the rearing of animals, chiefly cattle and sheep, and the scanty nature of the pasturage results in a nomadic type of existence, either men or animals, or both, wandering over huge distances. The Kirghiz horsemen of Asia, the cowboys of North America, and the stockmen of Australia are products of this type of vegetation and climate.

Agriculture can be carried on only in the river valleys, where irrigation is possible. Where this occurs, crops similar to those of the Mediterranean regions can be produced. In the Asiatic part of the region, the USSR (Union of Soviet Socialist Republics) is irrigating the area, and considerable crops of cotton are being produced.

4. Interior Highlands

GENERAL POSITION

30°–45° north and south of the Equator in the interior of land masses.

CHIEF AREAS

The great plateaux stretching from the Eastern Mediterranean to China, the plateaux between the Rocky Mountains within the latitudes indicated, and much of the

Transvaal, Orange Free State, and Cape of Good Hope Province in South Africa

CLIMATE

Similar to those indicated in the discussion on interior lowlands. The climate is extreme and the rainfall scanty.

NATURAL VEGETATION

Scanty herbage and shrubs

HUMAN ACTIVITIES

Cattle and sheep are reared, and men and animals lead a nomadic life. Where irrigation is practised on the plateaux from the mountain streams, cereals and Mediterranean fruits are produced. These regions are, however, not well suited to agriculture, and will undoubtedly remain regions of scanty population

(C) THE COOL TEMPERATE REGIONS

The general position of the cool temperate climatic type is between latitudes 45° and 60° north and south of the Equator. Within this main region the climatic variations are great, and subdivisions are made.

1. West Marginal

GENERAL POSITION

Between latitudes 45° and 60° north and south of the Equator, *on the western sides of continents.*

CHIEF REGIONS

North-west Europe (including the British Isles), British Columbia, Southern Chile and the Falkland Islands, Tasmania and the South Island of New Zealand. (*N.B.* The two last-named regions are small islands, and enjoy the peculiarities of the West Marginal Type of climate *without* occurring on the western side of a continent. This point will be clarified by subsequent reading)

CLIMATE

This type lies within the belt of westerly winds, and owing to their position as the *western* seabords of land masses the modifying influence of the ocean on climate is marked.

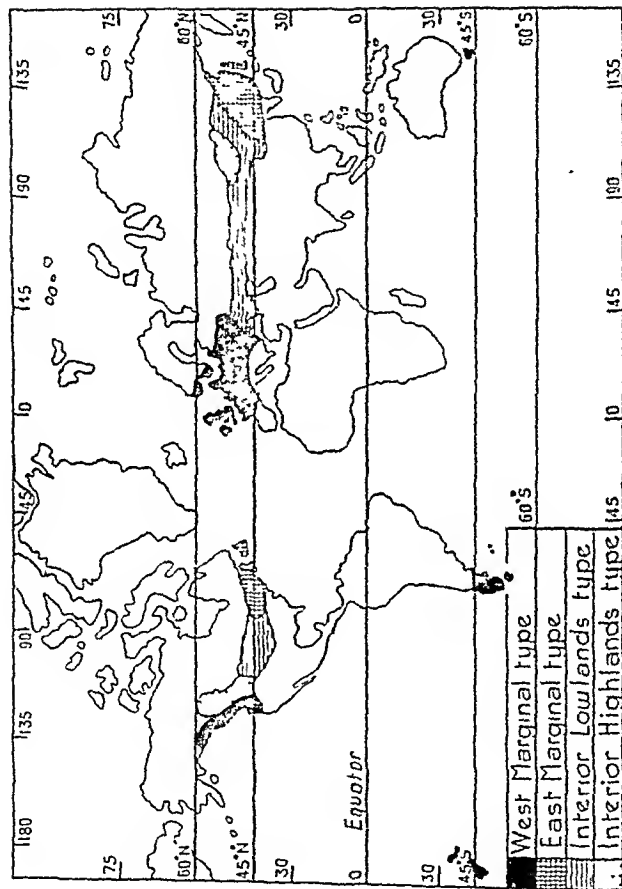


FIG. 28. DISTRIBUTION OF COOL TEMPERATE REGIONS

Temperature. Near the sea, the climatic type is characterized by mild winters and 'cool summers, but with increasing distance inland this influence of the sea is less marked, and the climate gradually becomes more extreme (i.e. more continental). This is borne out by the following temperature figures: where (A) and (B) represent coastal (e.g. south-west coasts of Britain) and inland (e.g. West Germany) stations respectively—

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept.	Oct	Nov	Dec	Range
(A)	40° F	41° F	44° F	49° F	51° F	53° F	62° F	63° F	55° F	50° F	45° F	41° F	22° F
(B)	30° F	33° F	42° F	48° F	54° F	60° F	65° F	62° F	54° F	46° F	30° F	32° F	35° F

Rainfall. Over much of the regions the westerly winds bring a general, "all the year round," rainfall. Distance inland again causes a modifying influence, for the rainfall decreases generally with increased distance from the sea. Where mountains lie in the track of the rain-bearing winds a much heavier rainfall ensues. To illustrate these facts three sets of rainfall figures are given: (A) represents a mountainous coastal station, such as would be found in Western Scotland, (B) a lowland station not far removed from the sea, e.g. Central Ireland; and (C) an inland station, such as would occur in East Germany.

	Jan.	Feb	Mar.	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
(A)	83"	87"	76"	82"	90"	91"	93"	98"	101"	86"	93"	100"	105"
(B)	29"	23"	29"	27"	25"	20"	31"	32"	24"	37"	30"	21"	334"
(C)	13"	10"	13"	14"	13"	18"	20"	19"	16"	14"	13"	12"	175"

NATURAL VEGETATION

The natural vegetation in these regions is forest growth of mixed species. Towards the poleward side and on the highlands conifers are usual, but towards the equatorial side and on the lowland regions these give place to trees which shed their leaves in the winter. Examples of these deciduous trees, as they are called, are the oak, elm, birch, and maple.

HUMAN ACTIVITIES

In regions where the forests are still largely uncleared, such as in British Columbia, Southern Chile, Southern New Zealand and Scandinavia, human activities are mainly concerned with exploitation of the forest products. Lumbering and forest industries, such as the manufacture of wood pulp and finished articles, are carried on. Sweden, for example, is noted for the production of pit props, wood pulp, and matches.

Over much of the rest of Europe lying within this climatic region, however, the forest has been cleared, and agriculture is carried on. The types of agriculture and the crops grown vary considerably within the region and will be more fully considered in the chapter on Europe. Generally speaking, cereals of one type or another form the staple crop, while root crops include the potato, sugar beet and fodder crops. Cattle and sheep are kept, the former mainly on the lowlands and the sheep on the hill pastures. Hemp and flax are also important crops.

Important fishing grounds occur off the coasts, and provide an additional source of livelihood for man in these regions.

2. East Marginal

GENERAL POSITION

45°-60° north and south on the *eastern sides of continents*

CHIEF REGIONS

North-eastern U.S.A. and Eastern Canada, Manchukuo and the neighbouring coastlands of the U.S.S.R., and South Argentina.

CLIMATE

Here the westerly winds prevalent in these latitudes are mainly offshore and do little to modify the climate. Further, having travelled over considerable land masses, they are relatively dry.

Temperature Climatic conditions here are more extreme than those of the West Marginal Type, but less extreme than those of the continental interiors. During the winter,

the rivers and ports are frozen, owing to the facts that the winds are coming from the cold interior, and that all the shores of all the regions included in this type are bathed by cold oceanic currents. Characteristic figures for a port in this region are—

Jan.	Feb	Mar	April	May	June	July	Aug	Sept	Oct.	Nov	Dec	Range
20° F	27° F	31° F	43° F	49° F	59° F	67° F	58° F	51° F	42° F	33° F	23° F	47° F

Rainfall The total amount is generally about 30 inches. During the winter the Westerlies bring a little precipitation in the form of snow, but it is during the summer, when the heated land mass causes inblowing winds from sea to land (a reversal of the westerly winds), that the maximum rainfall occurs. During this season thunderstorms are common.

Jan.	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
0 3"	0 4"	0 4"	0 9"	1 2"	2 0"	3 6"	5 6"	4 2"	4 4"	4 2"	2 4"	29 6"

NATURAL VEGETATION

The natural vegetation is forest, merging from coniferous in the north to deciduous in the south; between which a considerable tract in which both types, i.e. mixed forests, are found.

HUMAN ACTIVITIES

In these regions lumbering is important, and Eastern Canada is one of the leading regions of the world for the production of timber, wood pulp, and paper.

Where the land has been cleared of forest, agriculture is practised. In Eastern Canada, cereals and root crops are grown, while dairy farming and fruit growing are also important. On the fertile plains of Manchukuo, rye, root crops, and the soya bean are the chief crops, but this region, together with its neighbouring coastlands, is not yet fully developed.

South Argentina, the last region named in this climatic group is generally undeveloped

As in the case of the West Marginal lands, fishing is important off the coasts

3. Interior Lowlands

GENERAL POSITION

Latitudes 45° – 55° north of the Equator. In the Southern Hemisphere there are no regions in these latitudes far enough from the sea to experience the "interior" type of climate.

CHIEF REGIONS

The central plains of Canada, and North Central U.S.A., Southern Russia, and the Lowlands of Southern Siberia.

CLIMATE

Temperature. Owing to distance inland, the modifying sea influence experienced by the West Marginal Type is absent, and great extremes are usual (This represents the true "continental" type of temperature)

Winnipeg, with an annual range of 74° F., is characteristic.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Winnipeg	-7° F	-2° F	12° F	23° F	31° F	62° F	67° F	63° F	53° F	38° F	11° F	3° F

Rainfall This occurs mainly during the summer season when the heated air allows the air to blow in from the sea. The average rainfall for much of the regions mentioned is from 10 inches to 20 inches. The precipitation during winter is mainly in the form of snow.

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
0.4"	0.5"	0.8"	1.1"	1.7"	2.3"	2.1"	1.9"	1.6"	0.9"	0.4"	0.2"	13.3"

NATURAL VEGETATION

The rainfall here is insufficient for the growth of trees, and the main vegetation cover is grassland. These natural

grasslands are called *prairies* in North America and *steppes* in Europe and Asia.

HUMAN ACTIVITIES

The natural grasslands render these areas particularly suitable for grazing; and both in the New World and the Old cattle-raising on ranches is important. Where the rainfall is over 15 inches, agriculture is carried on, the major productions being cultivated grasses, e g. cereals

Both Canada and Soviet Russia are extensively engaged in wheat cultivation, while other crops of similar nature are barley and rye. In Southern Siberia agriculture is still in a primitive stage, but with the building of railways and development by Soviet Russia the region should eventually prove as productive as Canada from the point of view of crops.

4. Interior Highlands

GENERAL DISTRIBUTION

Roughly 45°-60° north of Equator.

REGIONS

Mountainous region of Southern Siberia and that part of the Rockies within the latitude indicated.

CLIMATE

✓ This varies with altitude and slope, but is rather similar, generally speaking, to that of the lowlands.

NATURAL VEGETATION

The scanty rainfall is sufficient to allow the growth of shrubs and grass.

HUMAN ACTIVITIES

Population is very scanty and is confined chiefly to the valleys, where agriculture is possible. Potatoes and cereals are produced and sheep are kept. Hunting is still important in the Siberian part of this region.

The areas covered form a large negative region of considerable trouble to man, for the highlands act as great barriers to communication.

(D) THE COLD TEMPERATE REGIONS

GENERAL POSITION

About 60° - 70° N. There are no land masses in the Southern Hemisphere lying within these latitudes.

CHIEF REGIONS

Northern Canada, where this type occurs well to the south of the general position, viz. 55° N- 60° N., and a broad belt across Europe and Asia, comprising most of Northern Russia and Northern Siberia.

CLIMATE

Temperature The high latitudes cause long winters, with short days and long nights, whereas summers are short, with long days and short nights. The winter season is severe, the short summer is relatively warm, thus over the whole region, annual extremes are great. In the interior of these great land masses the "continental" effect is well marked, and a range of over 100° F. is not uncommon. This factor is borne out by the figures given: those for (A) applying to an observation station near the sea, and those for (B) applying to a station well inland—

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec.
(A)	$+8^{\circ}$	$+10^{\circ}$	$+17^{\circ}$	$+27^{\circ}$	$+37^{\circ}$	$+47^{\circ}$	$+58^{\circ}$	$+68^{\circ}$	$+48^{\circ}$	$+15^{\circ}$	$+10^{\circ}$	$+9^{\circ}$
(B)	-5°	-47°	-26°	$+6^{\circ}$	$+27^{\circ}$	$+42^{\circ}$	$+61^{\circ}$	$+79^{\circ}$	$+71^{\circ}$	-1°	-53°	-50°

Rainfall The precipitation, whether in the form of rain or snow, is small, and falls mainly during the summer season, when the warmer air causes inblowing winds. Typical figures for an inland station are—

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
0.3°	0.1°	0.4°	0.3°	0.3°	0.9°	1.6°	1.3°	0.7°	0.2°	0.2°	0.1°	6.6°

NATURAL VEGETATION AND ANIMAL LIFE

In this cold region evaporation is small, so that the precipitation, although scanty, is sufficient for tree growth, if these trees are so developed as to resist loss of moisture as much as possible. Coniferous trees, such as pines, firs, and larch, possess needle-shaped leaves with glossy skins, factors which help to prevent loss of moisture in the plant. These comprise the great softwood forests of the world.

The animal life is of the fur-coated variety, of which the sable, black fox, silver fox, the lynx, and the beaver are the more usual specimens.

HUMAN ACTIVITIES

The population, generally speaking, is sparse; the chief activities are connected with exploitation of the natural resources. In the more accessible parts, lumbering of the softwood timber is carried on; the logs being floated down the rivers to the timber mills after the melting of the winter snows. In the mills the logs are either sawn into piles, or *crushed into pulp*. *Wood pulp is used for paper-making.*

These vast forest resources will undoubtedly prove of great value in the future, when the softwood timbers of other parts of the world are nearing completion. At present, the chief obstacle to exploitation is difficulty of access.

The other coniferous forest areas of the world are mainly confined to mountainous regions where the altitude causes climatic characteristics similar to those of the cold temperate regions. (See Chapter I: 1 F decrease per 300 ft rise in height.) The chief areas outside the cold temperate regions which produce coniferous trees are—

Europe. Alps, Carpathians, and the mountains of South Germany.

Asia. The Himalayas.

North America. The Rockies.

Southern Hemisphere. The mountainous parts of Southeast Australia, Tasmania, and New Zealand.

To revert to human activities in the cold temperate region, the importance of trapping of wild animals for fur must be mentioned, for these regions contribute the bulk of the world's furs. Canada and Siberia are the leading

areas for this trade. Owing to the severe climate, agriculture is extremely difficult, and the crops grown in the clearings are quick-growing species which can take advantage of the short, warm summer. Rye and oats, two hardy crops, are the chief cereals, and vegetables are also produced.

(E) THE TUNDRA OR ARCTIC LOWLANDS

GENERAL POSITION

North of the Arctic Circle in Europe and Asia, and north of latitude 60° N. in Canada.

CHIEF REGIONS

North Europe, North Asia, North Canada.

CLIMATE OF THE TUNDRA (Lowland Regions)

The high latitude is the chief factor governing climatic conditions. Long winters and short summers are experienced, and precipitation, which occurs mainly in the form of snow, is usually under 10 inches.

Temperature

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Range
-15° F	-10° F	-2° F	4° F	18° F	57° F	41° F	35° F	21° F	12° F	-9° F	-18° F	56° F

Precipitation

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
0.4"	0.7"	0.9"	0.8"	0.5"	1.1"	1.7"	0.6"	0.5"	0.2"	0.3"	0.3"	7.6"

VEGETATION

For most of the year the soil is frozen and covered with snow, but during the short summer period the snow and top layers of soil thaw, allowing plants such as mosses, lichens, and quick flowering plants to spring to life and carpet the Tundra with a brilliant vegetation cover. The only animal which can exist under such conditions is the

HUMAN ACTIVITIES

The sparse population leads a nomadic existence, for agriculture is impossible, and tribes such as Eskimos and Lapps exist chiefly by hunting, fishing, and the herding of reindeer.

Highland regions occur within the Arctic circles of both hemispheres, and here the effect of latitude is to cause an even more severe climate than is found in the Arctic lowlands. These regions, of which Greenland and Antarctica are examples, are for the most part covered with ice to a depth of unknown thickness. Only on the coastal lowlands of Greenland, which can be classed with the lowlands of the Tundra, is habitation of any sort possible.

EXERCISE 3

(1) Compare and contrast the following climatic types as fully as you can. Take into account position, climate, vegetation cover, and human activities.

- (a) Equatorial lowlands and monsoon, or
- (b) Sahara and Mediterranean, or
- (c) Cool temperate west marginal and cool temperate interior lowlands

(2) A, B, C, D, and E are five meteorological stations, and in each case the temperature and rainfall figures are given. For each station state—

(a) Whether it is in the Northern or Southern Hemisphere (compare the December and July temperatures)

(b) From which climatic type it is taken. Give reasons for your choice as concisely as possible

TEMPERATURES IN °F

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Range
1.	56	59	60	61	63	67	71	70	65	59	58	57	15
2.	-12	-7	-1	12	20	31	40	32	19	1	-6	-11	52
3.	79	79	80	81	82	84	85	83	81	80	80	78	7
4.	58	55	53	49	45	42	39	43	46	47	52	57	19
5.	68	73	78	83	88	89	86	83	77	73	71	68	21

RAINFALL IN INCHES

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
A	00	01	01	08	17	43	42	40	33	17	01	00	203
B	03	08	08	09	06	10	12	05	02	02	02	04	72
C	71	80	70	62	61	60	70	81	82	76	63	57	842
D	29	12	30	37	33	30	41	42	54	47	40	37	454
E	01	00	15	28	60	127	159	118	122	78	08	02	769

CHAPTER IV

WORLD AGRICULTURE: FOREST PRODUCTS AND FISHING

IN general, the peoples of the world can be divided into two main groups—those who engage in the production of food and the raw materials necessary for clothing; and those who manufacture. Owing to the fact that crop production depends to a large extent on climatic characteristics, world agriculture will be dealt with here, and manufacturing activities in Chapter VI. During this present chapter, mention will be made of times and seasons. These will generally be quoted for the Northern Hemisphere; you must bear in mind that the seasons are reversed in the Southern Hemisphere.

A. CEREALS

These form the basic foods of mankind, and are, therefore, referred to as "staple foods."

Wheat

This is the "staple food" of almost all white peoples, and consequently very extensive areas are devoted to wheat cultivation. It is a type of grass, and requires special soil and climatic conditions. From 15 inches to 30 inches rainfall annually, and a temperature of about 60° F. for three months during the ripening season, are conditions under which wheat thrives best. These climatic conditions, then, are generally those of the temperate regions, and wheat is mainly a "temperate" crop. The ideal conditions are those of the wetter parts of the *temperate grasslands*, and here are found the "*granaries of the world*." Outside cool temperate latitudes, wheat is produced in regions having a "Mediterranean" type of climate, and also in India. In various countries, wheat is sown and reaped at different seasons of the year, so as to fit in with the local climatic conditions.

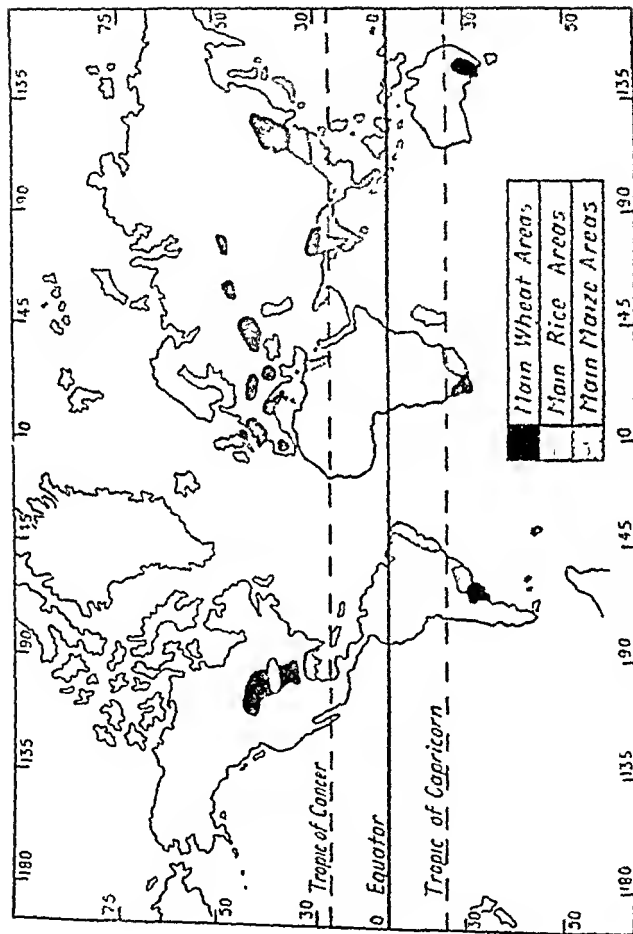


FIG. 29 DISTRIBUTION OF WHEAT, RICE, AND MAIZE

(a) TEMPERATE LATITUDES—WINTER WHEAT

Where the winter is not too severe, the seed is planted during the autumn, and the crop is cut in late summer or early autumn of the following year.

(b) TEMPERATE LATITUDES—SPRING WHEAT

Where the winter is severe, as in Northern U.S.A., Canada, Russia, and Siberia, the seed is planted in early spring, but the hot summers of this "continental" type of climate enable the crop to be harvested at the same time as the winter wheat.

(c) TROPICAL LATITUDES

India is the great producer in tropical latitudes. Here the crop is sown immediately after the hot, rainy seasons, grows during the cool (winter) season, and is harvested in January or February. Thus, in these latitudes, wheat is grown as a "winter crop." As the cool season is also the dry season, the requisite moisture is often supplied by means of irrigation.

Wheat is also very particular as to its ground conditions. The soil must be stiff, fairly deep, and yet well drained, hence the crop thrives on warm well-drained plainlands. Large plainlands with the requisite type of climate are found in Central U.S.A. and South Central Canada (the Prairies); Central and Eastern Europe (especially South Russia); Southern Siberia and Eastern Asia (especially Manchukuo); the Indus-Ganges plain of India (winter crop); North-east China; South-east Australia, and the Argentine. These regions, then, together with South Africa, comprise the chief wheat producers of the world.

Over much of Western Europe the climate is too moist, but wheat production is important in dry sheltered regions, such as Eastern England and East Central France.

Further, all regions which experience the Mediterranean type of climate grow considerable quantities. Under these conditions wheat is produced as a winter crop (cf. India) for the winter rains provide the moisture. The crop is usually harvested in April.

In many cases, however, the countries which grow wheat find that, after feeding their own populations, there is little

left for sale abroad. The United States, for example, grow about one-fifth of the world's wheat, but owing to the large home population, export is practically nil. Canada, the Argentine, and Australia, on the other hand, produce a surplus of wheat over home requirements and, therefore, rank as the chief exporters.

In the future, Southern Siberia and Manchukuo may become important exporters, but, before this happens, arrangements must be completed whereby the wheat can be transported quickly and cheaply to the ports. Lack of good communications at present retards the development of these potentially rich wheatlands, and when this difficulty is overcome by the construction of more railways, there is little doubt that Southern Siberia and Manchukuo will go ahead as wheat exporters.

WHEAT EXPORTS IN MILLIONS OF BUSHELS

	1931-35	1941-45	1945-46	1946-47	1947-48
U.S.A.	32	111	309	400	500
Canada	177	343	340	213	192
Australia	107	55	41	47	120
Argentine	122	106	69	62	108
Russia	20	-	-	-	44

The figures for 1947-48 are a forecast

Rice

This is a product of monsoon lands, and is the staple food of millions in much of South-east Asia. It is estimated that over 30 per cent of the world's total population depend on rice as a chief foodstuff.

Rice needs high summer temperature conditions, and enough moisture during the early part of the growing season to flood the area to a depth of some inches. The heavy monsoon rains or irrigation can ensure this, and the fact that during its early life the rice plant must grow under standing water demands that the crop be produced in low-lying swampy plainlands or river deltas. It can be produced on hill slopes if they are carefully terraced. It

is then referred to as "upland rice." Where all these conditions occur, growth of the plant is very rapid indeed, and three or four crops can often be taken from the same ground in the course of a year. This great return of Nature enables the soil to support great populations, and particularly dense populations are found in the lowland valleys of the rivers Ganges, Brahmaputra, Irrawaddy, Mekong, Sikiang, and Yangtze Kiang. Note that in these river valleys are found the conditions necessary—

- (a) High summer temperatures
- (b) Heavy summer monsoon rainfalls
- (c) Low-lying, easily flooded land
- (d) Irrigation, if necessary.

The major producers, then, are India, Burma, Indo-China, China, and South Japan, while outside the monsoon lands rice is grown in much smaller quantities in Java, the Malay Peninsula, and the delta regions of the Mississippi, the Nile, and the Po (in Italy)

China and India, between them, grow about 80 per cent of the world's rice, but so great is their home demand that none is available for export. In fact, in some years, these countries have to import. The only regions which export rice are Burma, Siam, and French Indo-China. The countries of temperate latitudes, especially Europe, import rice, but its use as a foodstuff is subsidiary to that of other cereals. A considerable proportion of the import is converted into starch.

Maize

Maize is valuable as food both for human beings and for animals. Its soil requirements are somewhat similar to those of wheat, but from the climatic point of view its needs are different. A considerable rainfall in the three months previous to harvest, and a hot sunny harvest season, represent ideal conditions. Such conditions are found on the equatorial sides of the main wheat belts of the world, and the chief regions of production are the U.S.A., Argentina, India, China, South Africa, and Brazil. Smaller quantities are grown in Queensland, South and South-east Europe (chiefly in the plains of Hungary and Romania).

The yield of maize is great, for one acre of maize yields twice as many bushels as one acre of wheat. Its value, however, is considerably less. The United States produce about 70 per cent of the world's maize, and the "corn belt" as it is called, occupies the extensive region stretching from Nebraska (42 15 N. 100 30 W.) and Kansas (38 30 N. 98 30 W.) in the west to Ohio (40 40 N. 82 30 W.) and Kentucky (37 20 N. 85 0 W.) in the east. Of this huge maize production, a little is exported to Europe, some is used in the preparation of corn flour, starch, and glucose, but by far the greater proportion is fed to pigs and cattle, the latter being brought in from the ranches of the west for fattening. This is often called 'economy on the hoof'. In this belt the pork and beef packing industries, with Chicago (41 50 N. 87 50 W.) as main centre, have become important.

In South Africa, maize is used to a considerable extent as a human food, and is known as "mealies".

The world trade in maize is small, a little being exported from each of the producing regions.

Barley

This is, like wheat, a product of temperate regions, but it has a considerably larger range, i.e. it can grow in regions too hot or too cold for wheat, and can adapt itself to ground conditions too poor for wheat. It is chiefly used for the brewing of beer and the distilling of whisky. The chief areas of production are North and Central Europe, especially in Scotland, North Russia, North Germany, and Scandinavia. Considerable quantities are also grown in Albania (37 0 N. 120 0 W.) and on the margin of the wheat belt in Canada.

Rye

This cereal, which can be produced on poor soils and in harsh climates, is grown for a foodstuff (rye bread) and for distilling. Although the total production is small, this crop is important in North-east Germany, North Russia, and the countries of the South Baltic. In these regions rye bread is an important food. Whisky in the United States,

vodka in Russia, and gin in Holland are other products derived from rye.

Oats

This cereal is grown under similar conditions to rye, and is used as a foodstuff both for human beings and for animals. In Europe, the chief regions of production are Scotland, Scandinavia, Germany, and Russia, in all of which oats feature as a human food. In North-eastern U.S.A. and Eastern Canada considerable crops are also produced.

Millet

Millet grows well in a hot dry climate and on poor soils, and can, therefore, be produced in tropical or monsoon regions where the rainfall is insufficient for rice. The rocky plateaux of much of Africa and Peninsular India produce considerable quantities. In some parts of Asia the farmers ditch their fields and grow rice in the ditches and millet on the banks.

B. TEA, COFFEE, COCOA, SUGAR, WINE, AND TOBACCO

Tea

Tea is made from the dried leaves of a small bush which flourishes in *monsoon lands*. Good drainage is essential, for the plant is injured by standing water near the roots, and thus tea is cultivated on *hill-sides*. The hilly regions of South China and India are the chief producers. In the latter country the chief areas of production are Assam (25 20 N 91.30 E), the hill-sides of Nepal (27. 45 N. 83.40 E.), and Bhutan (Southern Himalayas), the Nilgiri Hills in South India, and Ceylon. Much smaller quantities are also produced in Brazil and Natal (29.0 S. 30 30 E.).

This crop is cultivated almost entirely for export to temperate latitudes. Europe, North America and Australasia are the chief consumers.

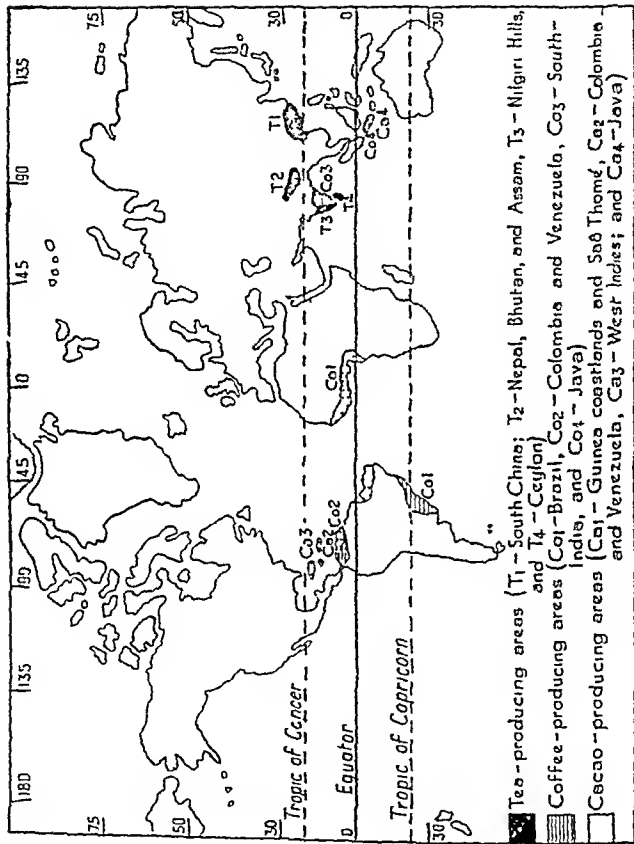


FIG 30. DISTRIBUTION OF TEA, COFFEE, CACAO

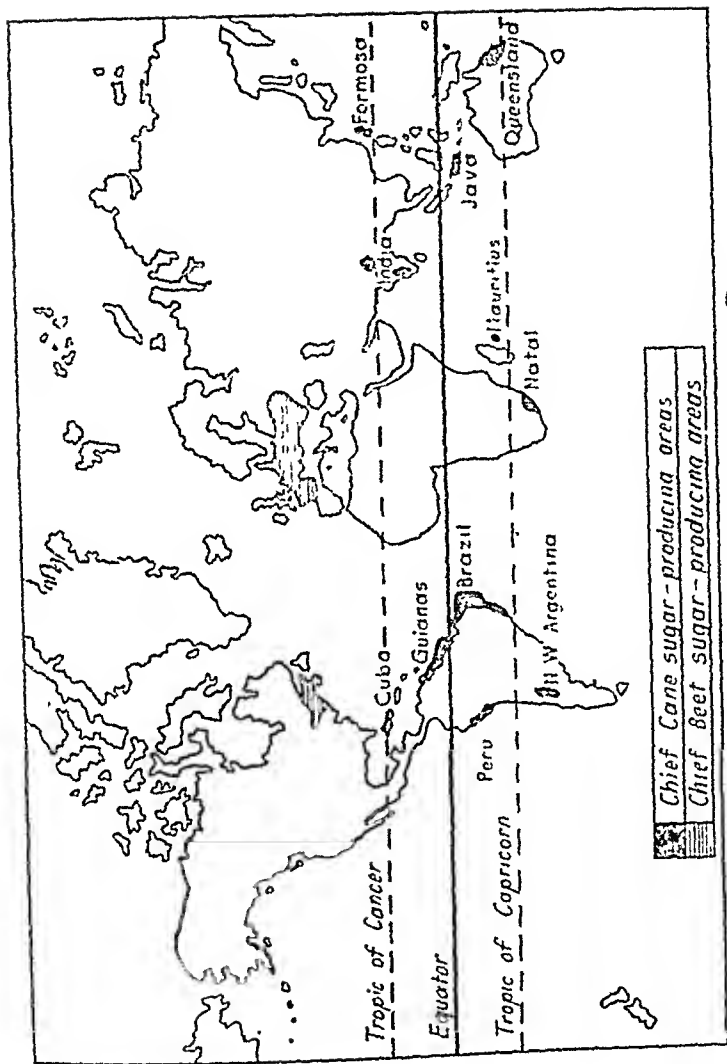


FIG. 31. DISTRIBUTION OF CANE AND SUGAR BEET

TEA CONSUMPTION IN MILLIONS LB

	1928-30	1936-38	1943-45
Great Britain	426	435	421
Rest of Europe	147	112	Not available
U S A	87	85	85
Canada	42	39	43
Australia	48	47	43

Coffee

Coffee, like tea, is derived from a bush, but in this case it is the fruit—or coffee bean—which produces the drink. Originally the shrub grew wild in North-east Africa, but its popularity as a drink in temperate latitudes led to its introduction as a plantation crop into other regions of the world. For large-scale production a warm moist climate, with no frosts, a position sheltered from high winds, and a deep rich soil are needed. The human element also enters, for much cheap labour is needed for the production and harvesting of the crop.

The climatic needs ensure that coffee can only be produced in tropical and sub-tropical regions. Of the producers, South-east Brazil, especially the state of Sao Paulo (23 50 S 47 10 W) is by far the most important, for this region produces nearly three-quarters of the world's supply. In early days many Italians emigrated to this region, and as the crop is produced at an altitude of about 2000 ft, the climate is such that they can work in comfort. It is, to a considerable extent, owing to this manner of overcoming the "cheap labour" difficulty, that Brazil has been enabled to progress as a great producer. Coffee is also grown in other states of South America, chiefly in Colombia (4 0 N 75 0 W) and Venezuela (7 0 N. 66 0 W.), while Java (7 30 S 11 00 E) and South India are also important. Ceylon and Arabia were at one time important—in fact, coffee was the first plantation crop to succeed in Ceylon; but production in these countries is now relatively unimportant.

As mentioned above, the great demand for coffee is in temperate latitudes, and much of the crop produced in tropical latitudes is exported. Europe and the U.S.A. are the most important buyers.

Cacao

The important part of the cacao tree is the bean, from which are derived cocoa and chocolate. The chief requirements are a hot moist climate all the year round, a rich soil, and a position sheltered from high winds and the direct rays of the sun. These conditions are met in the equatorial lowland regions, and it is fortunate that cacao requires but little attention, for the equatorial regions are unsuitable for human labour. Africa ranks as the leading producer, most of the crop being derived from the region round the Gulf of Guinea and the small island of Sao Thome (0 15 N. 6.35 E.). The northern coastlands of Brazil and Venezuela, the West Indies, and Java also produce considerable quantities.

The chief markets, as in the case of tea and coffee, lie in temperate latitudes, and almost all of the cocoa produced is exported to these regions.

Sugar

Sugar is derived from two sources—sugar cane, which is a product of tropical regions, and sugar beet, which is grown in temperate regions.

SUGAR CANE

This is a type of tropical grass. The juice containing sugar is derived by crushing the sturdy stem between rollers. Climatically, an annual rainfall of 55–65 inches is required, but harvest time must be dry and sunny; and a long warm growing season with average temperatures of over 70° is also necessary. In some regions, notably Peru and North-west Argentina, the rainfall is insufficient, and irrigation is practised. British India, Java, and Cuba are the chief producers, these three producing about 60 per cent of the total world production. India, however, consumes all of her huge production; and thus leaves Cuba and Java to

rank as the principal exporters. Other important regions of production are the rest of the West Indies, the tropical coastlands of South America (especially Peru, Brazil, and the Guianas), North-west Argentina (around Tucuman), Queensland, Natal, and the islands of Formosa (off the coast of South China), and Mauritius (off the coast of Madagascar). The State of Louisiana in Southern U.S.A. also produces sugar cane.

With the exception of India and the U.S.A., all the producers export a considerable proportion of their crop to the temperate regions of the world. Great Britain buys to a considerable extent from her empire possessions, chiefly Mauritius, Queensland, British Guiana, and the British possessions in the West Indies, while the U.S.A. imports largely from Cuba, and Japan from Formosa and the East Indies.

SUGAR BEET

This is a root crop which needs a cool, temperate type of climate, and a deep fertile soil. Good drainage is also essential.

The chief areas of production are Eastern Canada, North-east U.S.A., and Europe. Within Europe, the plainlands of Germany and Russia are the most important regions, although France, Poland, and Czechoslovakia also produce considerable quantities. In Great Britain cultivation of sugar beet has progressed, helped by Government subsidy, and to-day the production of sugar beet is of considerable importance in East Anglia.

Between the production of cane and beet sugar a contrast lies in the fact that much of the sugar cane grown is exported, whereas the beet sugar is consumed without being exported. Almost without exception, the countries growing beet have to import cane sugar to supplement their own sugar production.

Wine

Wine is derived from the juice of the grape. This plant grows well in the Mediterranean type of climate where the long dry summer favours ripening. Outside these main

regions, the grape vine grows well on hill-slopes facing the sun, i.e. southward-facing slopes in the Northern Hemisphere and northward-facing slopes in the Southern Hemisphere. Although all wines are made from one type of raw material—the grape—various regions produce various wine specialties, e.g. champagne from the district of that name in Eastern France, port from the Donro valley of Spain and Portugal, Rhenish wine from the Rhine valley of Germany. These differences are caused mainly by differences in the soil and methods of preparation.

The main producers are the Mediterranean countries of Europe, France, and Germany; while of recent years Australia, South Africa, and California, all of which experience the Mediterranean type of climate in certain localities, have begun to export wines.

Tobacco

Tobacco can be grown in climatic regions ranging from equatorial to cool temperate, and thus the crop is widely distributed. A light loose soil is generally desired, and it is the differences in soil as much as in climate which makes the tobacco characteristic of its region of production.

Cigar Tobacco is grown both in the West Indies (Cuba) and in the East Indies, where Manila (14.30 N. 121.12 E.) and Sumatra (0 30 N. 101.0 E.) are the chief producers.

Pipe Tobacco. This type is generally grown in inland situations. Ohio (U.S.A.), the region round Toulouse (France), and the upper Danube valley are the main regions of production.

Cigarette Tobacco Virginia (U.S.A.) and the countries of the Eastern Mediterranean, especially Egypt and the coastal regions of Turkey, specialize in this type.

South African tobacco, of which all types are produced, comes mainly from Rhodesia and the Cape Colony.

C. CATTLE AND SHEEP

Cattle and sheep thrive on the natural grasslands of the world, and are found in considerable numbers both in tropical and temperate grasslands. Of these two main

regions, the latter is by far the more important. Generally speaking, cattle need a richer type of grass than sheep, and if cattle and sheep are found in large numbers in a certain region, cattle predominate in the damper region and the valleys, whereas sheep are found mainly in the drier parts or the hill-sides. In England, the Cheshire plain, for example, is moist and low-lying, and cattle are important, but on the drier eastern slopes of the Pennines sheep have pride of place.

Cattle are kept for the production of two food commodities—beef and dairy produce—and the conditions under which the cattle are kept differ in each case. Again, sheep kept for mutton need a slightly different climate and treatment from those kept primarily for wool.

Beef Cattle

Cattle kept for beef require but little attention, and can be allowed to wander over extensive areas in search of pasturage. When two years old they are often sent to agricultural regions, where they are fattened for market on maize, cattle cake, or alfalfa grass. In the U.S.A., for example, the cattle are driven in from the western ranches for fattening in the "corn belt."

The great natural grasslands of the world, then, are ideally suited to beef cattle, and herds of cattle are kept where the land has not already been devoted to agriculture. These areas, known as ranches, are to be found in the Argentine and Uruguay (33° S. 55° 30' W.), the western prairies of Canada and the U.S.A., Western Queensland, and South Africa. Over much of the remainder of the tropical grasslands of Africa the keeping of beef cattle will doubtless become of great importance in the future, but some means must first be found of overcoming the activities of the tsetse fly, the bite of which is generally fatal to cattle.

Most of the countries of Europe keep large numbers of beef cattle, but here they are fed on meadow pastures, hay, cattle cake, and root crops (swedes, mangolds) in the same area. In other words, they form *part* of the agricultural activities of a district, which is thus said to engage in "mixed farming." This term is used when, on the same

farm, a variety of crops are produced and animals are kept. This type of farming will be more fully dealt with in a later section

In Europe, generally, the supply of home-produced beef is insufficient for home requirements and much is imported. It is possible to send "chilled" meat over considerable distances without deterioration in value. The Argentine is the biggest exporter of beef in the world, followed by Uruguay and Australia. Great Britain has recently concluded a trade agreement with the Argentine, one of the chief items of which is the purchase by Britain of 400,000 tons of meat.

Dairy Produce

Cattle kept for the production of milk need more attention, a moister climate, and more concentrated foodstuffs than beef cattle. Further, until recent years, it was impossible to send dairy produce, such as milk and butter, considerable distances, and the dairy cattle were, therefore, found near the markets. The ranches, then, are generally unsuited for dairy production, and most dairy cattle are found in the cool temperate "mixed farming" regions of Europe, North-eastern U.S.A., and Eastern Canada. All these regions are well populated, and thus form the chief markets for dairy producers.

Of more recent years, the use of cold storage methods has made possible the transport of dairy produce over considerable distance, and Australia, where dairy cattle are kept chiefly in the cool moist south-east, New Zealand, and Argentina all export.

The chief trade in milk (fresh and condensed), butter, and cheese can be summarized as follows—

Exporters. The Netherlands, Denmark, Switzerland, U.S.A., Canada, Australia, and New Zealand.

Importers. Great Britain, Germany, and France.

Draught and Hides

India possesses many cattle, which are used mainly for pulling carts and ploughing. The meat and milk are poor and little used, and the only production of value

to the world derived from these cattle are the hides and tallow.

In this connexion India, the Argentine, and Australia rank as principal exporters. The United States, in spite of its huge cattle production, imports cattle hides; as also do Great Britain and Germany.

Sheep

While sheep thrive on drier conditions than those necessary for cattle, a further difference of this type is found in the keeping of sheep for wool or mutton. Sheep kept primarily for mutton need a moister, cooler climate than those which produce the best wool. Thus, while a country such as Australia produces both wool and mutton, better wool comes from the drier regions than from the moist regions. The huge demands for both wool and mutton have led to much cross-breeding in Australia and New Zealand, and thus a type has been evolved which produces good wool and mutton. In the mixed farming areas of Europe, North-eastern U S A, and Eastern Canada, wool and mutton are produced, but the main producers are the grasslands of South-east Australia, South Africa, Western U S A, Argentina, and on the eastern side of the mountains in South Island of New Zealand (the Canterbury Plain—origin of "Canterbury" lamb).

World trade can be summarized as follows—

Exporters Australia, South Africa, Argentina, New Zealand

Importers Great Britain, Germany, France.

Mixed Farming

In mixed farming, as the name implies, the farmer does not specialize in any one product, but grows various cereals, root crops, and vegetables, and also keeps cattle and sheep. This type of farming is carried on in densely peopled countries like England, where the high cost of land makes it necessary to use the soil to its fullest capacity. If, as in the prairie region of Canada, wheat is grown year after year, the soil suffers and the crop returns per acre must eventually decrease. However, this does not seriously

perturb the Canadian farmer, who possesses such immense acreage that he does not need to cultivate each acre to its fullest capacity. His method, then, is referred to as *extensive* farming. In England, however, as in other densely peopled regions, each acre must be fully used, and *intensive* methods are necessary.

The loss of soil fertility is diminished by changing the crop on a certain field from year to year (this is referred to as the "rotation" of crops), and the maintenance of cattle and sheep, which help to fertilize the land naturally. A typical rotation would be: year 1, wheat, year 2, oats, year 3, beans; year 4, barley, year 5, clover. A further reason for "mixed" farming in densely peopled countries is the variety of foodstuffs required. Mixed farming methods help to meet this demand.

D. CLOTHING MATERIALS

Wool

This commodity has already been dealt with under the heading of "Sheep."

Cotton

The raw material which forms the basis of much of our clothing is a soft downy substance, rather resembling wool, which grows in the pods of the cotton shrub. The cotton plant is a product of tropical regions, since it needs warm, moist, climatic conditions. The monsoon regions are very suitable, but the total rainfall must not exceed 40 inches, and drainage must be good (contrast rice). The plant thrives in regions of light soil not far removed from the sea, for salt, either in the air or in the soil, seems to have a beneficial effect. The chief region of production is the Southern U.S.A. where more than half of the world's crop is produced. The whole region ranging from the state of Georgia (32.30 N. 83 0 W.) to Oklahoma (35 40 N. 97.0 W.) and Texas (31.15 N. 98 30 W.) produces a good quality cotton; while in East Georgia and South Carolina can be grown the finest cotton in the world—"Sea Island cotton."

Other important regions of cotton production are China; India, chiefly on the plateau behind Bombay; the Nile

Valley of Egypt; and Brazil. The cotton produced in India and Brazil is of much poorer quality than that of the U.S.A. and Egypt. Originally all the cotton grown in these regions was exported to more temperate latitudes, especially to Lancashire, Germany and the cities of North-eastern U.S.A. for manufacture, but of more recent years cotton mills have been set up within the areas of production of the raw material. This activity, of great importance to the industrial well-being of Lancashire, will be more fully dealt with later when the countries are considered in more detail. Japan has also, of recent years, developed as a manufacturer, and therefore ranks as an importer, together with Great Britain and Germany, of raw cotton.

The fact that the U.S.A. produces such a large percentage of the world's crop makes all manufacturing countries dependent on it for much of their raw material, and in order to supply the mills of Lancashire, the production of cotton has been encouraged throughout the Empire, where there are many areas producing cotton in small quantities. Full development of these areas would render Lancashire virtually independent of American cotton. In Africa, for example, it is hoped that a few years' development will enable Anglo-Egyptian Sudan to produce over a million bales a year, while Uganda (20° N. 32° 30' E.), Nigeria (10° 0' N. 80° 0' E.), Nyasaland (12° 30' S. 33° 40' E.), and the Union of South Africa could increase their present total production of 130,000 bales (1 bale weighs 400 lb.) to 1,700,000 bales. In Queensland, too, considerable crops could be produced. The chief difficulty which these regions are encountering at present is one of labour supply, for during the picking season especially, much hand labour is required. In the U.S.A. this work is carried on mainly by the negro descendants of the original slaves.

Flax

Flax, from which linen is made, is the fibre of a plant which grows well in temperate latitudes. Russia, Belgium, and Northern Ireland are important areas of production (N.B. The same plant is grown in the tropics for the production of its seeds—*linseed*. These seeds are crushed

and the produce is exported as linseed oil. India and South China are the chief regions of production of linseed oil.)

Silk

The raw material is the result of the spinning of silk thread by the silkworm, and thus the areas of production depend on the conditions of life for this natural "manufacturer." The silkworm feeds on mulberry leaves, and these grow well in China, Japan, the southern slopes of the Alps in Italy, and Southern France. These areas, then, rank as exporters, while the chief manufacturing areas and silk markets of the world are Lyons in France (45 46 N. 4 50 E.), Paterson in North-eastern U.S.A. (40 55 N. 74 8 W.), and Krefeld in Germany (51 12 N. 6 33 E.). Production in Japan was adversely affected by the war, but production is now being stimulated as part of the recovery programme.

Hemp and Jute

These are not clothing fibres, but may conveniently be included here.

Hemp, which produces a coarser fibre than flax, can be grown either in cool temperate or warm temperate regions. Russia, the Danubian countries, and Italy in Europe, China and India in Asia are the chief producers. The hemp of these countries is used for the making of canvas and ropes.

Manila hemp is the product derived from a tropical tree, and is exported mainly from the Philippine islands. Ships' riggings are usually made from manila hemp.

Sisal hemp, which is produced in large quantities in Yucatan (Central America) and the West Indies, is used mainly in the manufacture of sacking and twine.

Jute. This is a monsoon crop, and is grown in Bengal (India and East Pakistan), South China, and Formosa (24 0 N. 121 0 E.). Of these regions Bengal is the most important, for huge quantities of jute are grown in the swampy lowland region of the Ganges-Brahmaputra delta and exported from Calcutta to mills in Dundee (Scotland) and Ghent (Belgium). Mills have also been set up in

Calcutta for treatment of the raw material. The fabric produced, like that of sisal hemp, is coarse, and is used largely for sackcloth.

E. FOREST PRODUCTS

Rubber

Rubber is produced by the treatment of juices derived from certain equatorial trees growing wild in the Amazon and Congo basins. Originally its sole use was as an eraser, and at that time sufficient rubber for the needs of the world was obtained from the wild species. During recent years, the uses of rubber have multiplied, and with the huge demand created by motor transport, world production of rubber has become of great importance. Rubber plantations have been established in regions with an equatorial type of climate with such success that to-day more than 90 per cent of the rubber produced is from the plantations. The Malay peninsula, the East Indies (especially Java and Sumatra), and Ceylon are the main regions engaged in cultivating rubber, producing between them about 95 per cent of the world's plantation rubber. You should note that the control of the rubber trade of the world is in the hands of the British and Dutch, whereas the U.S.A. is a large buyer of rubber. The plantation system is being developed in the Amazon Basin, sponsored by U.S.A. The centre is Manaus. From the regions of production nearly all the raw rubber is exported, the chief importers being the countries of Europe, the U.S.A., and Canada.

Synthetic Rubber

This is a product of coal by-products and chemicals. It is manufactured chiefly in U.S.A., where the Government are proposing to produce a minimum of 600,000 long tons a year. Since December 31st, 1946, Great Britain has ceased to import or manufacture synthetic rubber.

Coco-nut Palms

The coco-nut palm, from which oil, copra (the dried kernel), and coir (a fibre useful in rope making) are derived is an equatorial product. The chief areas producing and

exporting these commodities are the East Indies (especially Java), Ceylon, Zanzibar (6° S 39° 18' E.), and Jamaica (18° 15' N. 77° 30' W.)

Oil Palm

This thrives under climatic conditions similar to those of the coco-nut palm, and produces from "palm kernels" oil which is greatly used in temperate latitudes for the manufacture of margarine and soaps. South Wales imports considerable quantities for use in the tinplate industry. The West Coast of Africa (round the Gulf of Guinea), the Malay peninsula, and the East Indies are the chief producers.

Dates

A product of desert oases or regions bordering the desert, this foodstuff is exported mainly from the North African coastlands.

Bananas

Bananas are greatly used as a food in many equatorial and warm temperate regions. The chief exporters at the present time are the Canary Islands, Jamaica in the West Indies, and the Fiji Islands (South-west Pacific Ocean).

Timber

This forest product falls into two main groups—the softwood and the hardwood timbers

Softwoods

These are obtained chiefly from the coniferous forests which occupy the whole of the cold temperate climatic region and the upper slopes of the mountains in lower latitudes. Softwood timbers are used for building purposes, and for the manufacture of wood pulp and paper. In Europe the chief softwood producers are Norway, Sweden, the countries bordering the Baltic Sea, and North Russia. Considered as a whole, Europe uses more softwoods than she produces, and has to import considerable quantities. In Asia (where the softwood timbers occupy a broad belt stretching across Siberia), there are enormous resources, but transport difficulties arise. In most regions of softwood production, the

trees are felled during early winter, and floated down the rivers to the saw mills and pulp works in spring and summer. From here the produce is exported. This method would be almost impossible in Siberia, for power is lacking and it is virtually impossible for ships to reach the river-mouths along the north coast. Rail transport overland is equally difficult, and would, in any case, be far too expensive. Hence it would appear that most of these enormous reserves must remain unexploited.

In Canada, coniferous forests, as in the case of Siberia, occupy a broad belt running across the continent, and lumbering is very important in the Eastern and Western States, i.e. Ontario, Quebec, and British Columbia. The North-western States of the U.S.A. (Washington and Oregon) are also large producers. These States export considerable quantities to North-eastern U.S.A., and it is interesting to note that the Panama Canal route is largely used in this connexion.

The production of wood pulp and paper is so closely connected with the activities of the softwood forests, that it seems to demand treatment here. The chief conditions necessary for large-scale production are a large reserve of softwood timbers, cheap power, running water for chemical processes, and easy transport to near-by markets and the coast. Rivers are thus very valuable, for they provide transport—both of logs to the mills and the manufactured produce from the mills, running water for chemical processes and bleaching, and often, where the water is swift or waterfalls occur, electricity which satisfies the last of the needs—cheap power. In Europe, the chief manufacturers and exporters of wood pulp and paper are Sweden, Norway, and Finland. Germany is also a producer, but her production scarcely meets home demands. The other countries of Europe are all importers.

In Canada, huge quantities are produced and exported from the Eastern States, where Ottawa (45° 20' N. 75° 41' W.) is one of the chief centres. The produce is exported largely to Europe and the U.S.A. This latter country itself produces considerable quantities, but not sufficient for home requirements.

HARDWOODS

These woods, derived from deciduous trees, are used chiefly in building and furnishing. Cool temperate lands provide most of the hardwoods used; and the countries of North-west Europe, the St. Lawrence Valley of Canada, and the countries which experience a Mediterranean type of climate are the chief producers

From the forests of equatorial and monsoon lands come valuable woods such as teak from Burma and the peninsula of South-east Asia; and mahogany from Western Africa. Compared with the softwood products, international trade in hardwood is small.

F. FISHING

The chief fishing grounds of the world are in the shallow seas of the "continental shelves" in temperate regions.

North-west Europe

The continental shelf, of which the North Sea is a part, is here of considerable extent, and stretches from Norway to Spain. Almost all the European countries engage in fishing to some extent, but the biggest fleets belong to Britain, Holland, Norway, and Germany. The fish caught vary in type, but herring, haddock, and cod are the chief species. Much of the fish caught is eaten by the peoples of the countries engaged in fishing, while considerable amounts are also salted and exported to the Mediterranean countries of Europe, where the large Catholic population provide a ready market.

North-east of North America

There is here another extensive continental shelf, and the fishing "banks" off Newfoundland attracted European seamen early in history. The fish caught, and the disposal thereof, are similar to those of North-west Europe

North-west of North America

On the continental shelf the fishing activities are similar to those on the eastern seaboard, while fishing for salmon along the deeply-indented coastline and in the rivers is also important. Alaska and British Columbia engage in salmon

fishing, and from these regions large quantities of canned salmon are exported.

Eastern Asia

On the narrow continental shelf along the coasts of Japan and in the Yellow Sea, fishing is engaged in by Japanese and Chinese fishermen. The large population of the two countries of Japan and China consume the fish caught, and little is available for export.

Various other countries of the world also engage in fishing, and of these remaining regions the most important are South-eastern Australia, New Zealand, and South Africa. Local fishing peculiarities of interest occur in the Western Mediterranean, which produces sardines and tunny, and in the estuaries of the Thames and Rhine, where oysters are produced.

G. Whaling

At an International Conference in 1946, thirteen countries were represented, among them Great Britain, U.S.A., Australia, Norway, and Mexico.

The position is serious owing to the loss of shipping during the war, for example, as a result of the war Norway's 'Floating Factories' (for the immediate extraction of oil) were reduced from 13 to 6.

The whaling industry is centred in the Antarctic with factories in various countries. The season normally ends in December.

EXERCISE 4

(1) Name the most important regions of production of each of the following commodities, and discuss the factors involved in the production of each—wheat, rice, maize, sugar (cane and beet), and cotton.

(2) On a roughly-traced blank map of the world mark the chief areas of large-scale production of—

- | | |
|-------------------|----------------------|
| (a) Beef | (e) Rubber. |
| (b) Dairy produce | (f) Coco-nut palms. |
| (c) Mutton. | (g) Bananas |
| (d) Wool | (h) Softwood timbers |

Mark also four important fishing grounds

CHAPTER V

POWER, MINERAL WEALTH, INDUSTRY, AND SETTLEMENTS

UP to the present, the only human activities discussed have been those connected with the exploitation of the natural vegetation and agriculture, activities which, in the main, are governed by climatic conditions. Man, however, demands far more than the bare necessities of food for material comfort, and his clothing, home comforts, movement (transport), and recreation, to mention but a few examples, create the need for manufacture. Just as there are large regions especially suited by climate and soil conditions for certain types of agriculture, so there are also areas ideally suited for manufacturing activities. It is with the consideration of the factors which make a region industrially important that we are concerned in this chapter.

A POWER

In order that a region may engage in large-scale manufacture, power for driving machinery is necessary. To-day, there are three main sources of power—coal, oil, and running water. It must be borne in mind that common fuels and power agents such as electricity, petrol, or gas, are not basic powers in themselves, but are merely derived from the three main sources.

1. Coal

The invention of the steam engine and the suitability of coal as a fuel for boilers have enabled factories to be set up on many of the world's coal-fields. The mining of coal, as is mining of all mineral wealth, is a "robber" industry, for the coal is not being replenished as it is used. At one time it was feared, for example, that the coal resources of Britain would be exhausted within 100 years, but recent research has allayed that fear. As you will see from subsequent reading, many of the great coal areas of the world

have become densely populated, and the control of manufactures which this mineral gives has to a large extent been the means by which the great nations of the world have reached their pre-eminence. It is very important, then,

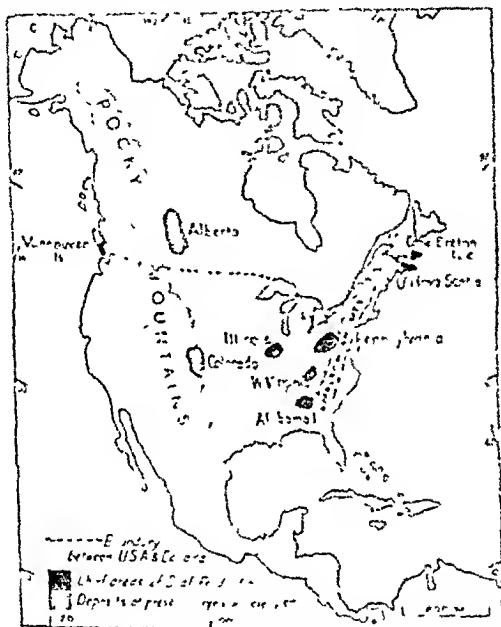


FIG. 32 MAIN COAL FIELDS OF CANADA AND THE U.S.A.

to examine the world output of coal, and the following sections demand your closest attention (N.B. Many coal-fields occur on margins of hilly regions)

Sources of Coal Supply

THE UNITED STATES OF AMERICA

Before the war of 1939-45 the country produced about 45 per cent of the world's coal, but of this huge amount little

Alberta in the west is believed to have extensive deposits, but the area is not yet developed to any great extent. There is also a small coal-field on Vancouver Island.

GREAT BRITAIN

Before 1939 Britain supplied about 20 per cent of the



FIG. 34. DISTRIBUTION OF MAIN COAL FIELDS OF EUROPE

world's supply, and the exact position of each of the main coal-fields should be closely studied. The most important fields are those on either side of the Pennines (the York-Derby-Notts, Northumberland-Durham, Cumberland, and the Lancashire fields), the Midlands fields (Staffordshire, Warwick, and Leicester), South Wales, and the fields in the Scottish Lowlands (Ayr, Lanarkshire, and the Edinburgh-Fife fields). The 1947 figure of coal production in Britain was 189 million tons.

GERMANY

With 16 per cent of world output Germany was the third producer in 1938. The chief fields are in the Ruhr region of Westphalia, the Saar valley, and in Silesia.

OTHER EUROPEAN PRODUCERS

The most important of the other coal producers of Europe are France, where coal is mined chiefly in the north-east, and to a less extent on the margins of the Central Highlands; Belgium (the Meuse Valley); Poland, whose coal-field is a continuation of the upper Silesian field of Germany, Czechoslovakia, Spain, Russia. Many of the countries of Europe consume their own production and have to import, but Great Britain and Poland rank as exporters.

ASIA

The total output of the whole of Asia comprises only about 5.5 per cent of the world's supply, but there are believed to be enormous resources, chiefly in the wild, largely undeveloped western provinces of China (Shansi, Shensi, Kansu, and Szechwan). Of the present Asiatic producers, Japan leads with 2 per cent of the world's supply, but this is insufficient for her home needs, and she imports considerable quantities. Other producers are China, India (chiefly in the Damodar valley), and Formosa.

THE SOUTHERN HEMISPHERE

The output is generally small, but there are important fields in Australia (in the highland region behind Sydney and Newcastle), in South Africa, in Chile, and in New Zealand. A large proportion of the coal mined in these countries is used in coaling ships.

2. Oil

Petroleum is found in low-lying plainlands in various regions of the world. Its uses are many, for it can be used directly as a fuel, and it can be split up into parts which can then be used separately. Lubricants, petrol, paraffin, naphtha, and vaseline are all important products derived by treatment of the main oil.

The use of petroleum as a source of power has increased enormously in recent years, and many areas which were once important, e.g. Pennsylvania, have now become

exhausted. In spite of the widespread occurrence of petroleum and the fact that new oil-fields are continually being found, there seems little doubt that if the present rate of consumption continues, the world's supply will be exhausted long before the world's coal resources.

Petroleum leapt to importance as a means of power after the world's great manufacturing centres were established, and thus it is not surprising to find that petroleum is taken to the manufacturing centres, with the result that few manufacturing activities develop on the oil-fields themselves. Another reason for this is that an oil-field is quickly exhausted and if factories were set up to utilize the oil on the spot, it would not be many years before this source of power would be exhausted.

Oil has an advantage over coal in that it can easily be conveyed by means of pipe lines over great distances to the centres needing it or to the ports for export.

THE MAIN PRODUCERS

Owing to the fact that new areas are rapidly becoming exploited while others, equally rapidly, become exhausted, figures of production of various areas would be quickly out of date, and thus description of oil-producing regions must of necessity be a general one.

The U.S.A. produce most of the world's supply the chief areas being found in the mountain foothill regions west of the Mississippi (chiefly in Texas, Oklahoma, and Kansas), the River Ohio Valley (Pennsylvania and the State of Ohio), Illinois, and Southern California. The oil is pumped either to the Gulf ports or direct to the large manufacturing areas in Pennsylvania. Mexico produces considerable quantities, chiefly in the east coastal foothills. Most of the Mexican production is exported from Tampico (22° 20' N. 98° 12' W.) and Vera Cruz (19° 20' N. 96° 30' W.).

In South America, the northern States of Venezuela and Colombia are producers and exporters, while in the old world Russia—from the Caucasian region around Baku (40° 27' N. 49° 48' E.)—Romania, and Persia are the leading countries concerned. A little is also produced in the Dutch East Indies.

PETROLEUM PRODUCTION 1947

U S A	.	.	.	250 0 million tons
Central and South America	.	81 8	„	„
Middle East	.	41 6	„	„
Indonesia		2 6	„	„
Russia	.	26 0	„	„
Romania	.	3 8	„	„

Natural gas is also a product of the petroleum oil-fields, and is greatly used in the Pennsylvania-Ohio district of the U.S.A.

3. Running Water

In early days swift-running streams were used directly to drive water wheels; but now this motive power is transformed into electricity—a form of power which can readily be carried over hundreds of miles. Generally speaking, it does not “pay,” i.e. it is not economic, to convey electricity more than 400 miles. Nevertheless, this electrical power can quite readily be taken to manufacturing centres at a considerable distance.

Swift-running mountain streams are necessary for the production of hydro-electric power, and it will be noted that the development of this type of power is most advanced in mountainous regions lacking in coal resources. Other necessary factors are that the streams are perennial, and that there is a lake in the upper course to control the flow of water to some extent. Northern Italy, Norway, Sweden, Switzerland, South Germany, and the Alpine region of France are to the fore in Europe, while the swift-running streams and waterfalls of Eastern Canada render the whole area rich in power. (It is this form of power which makes possible the wood pulp and paper manufactures.) Hydro-electricity is also an important part of the economy of Australia and New Zealand, while the Dominion of India is planning to extend development.

There are many areas where production of hydro-electricity is possible, but has not yet been attempted, and even those progressive areas which do develop this type of power have not yet fully utilized their resources. Hydro-electric power can be contrasted with coal and oil in that it is not a “robber” activity, for the mountain streams and

falls are continually being replenished by Nature. There is little doubt that this form of power, "white coal" as it is sometimes called, will eventually supersede coal and oil to a considerable extent

4. Other Forms of Power

The threats thrown out at various times by geologists and statisticians as to the eventual exhaustion of coal and petroleum supplies prompt research into the possibilities of using other forms of power. Alcohol, which can be derived from many vegetable substances—and is, therefore, inexhaustible—is being used in some countries to supplement the supplies of petrol. Other possible sources of power which have been the subject of experiment are the tidal forces of the sea, and the tremendous solar heat in the hot desert regions

B OTHER MINERAL WEALTH

The natural minerals of value to mankind, other than coal and iron, may be grouped into three classes—

(a) The metals, such as iron ore, gold, silver, lead, zinc, tin, copper, nickel, and cobalt

It should be noted in subsequent reading that these metals are generally found in mountainous regions

(b) Salt deposits, which class includes the common salt used in eating and the making of glass and chemicals, and also fertilizing salts such as the nitrates of Chile (South America)

(c) Precious stones, such as diamonds and rubies.

In the following description the great mineral wealth of North America and especially the U.S.A., should be noted.

1. Iron Ore

As in many other commodities, U.S.A., with over 40 per cent of the world's output, leads in production. The chief areas are to be found in the hilly area to the west and south of Lake Superior (47° 30' N 88° 0' W), and towards the southern end of the Appalachian regions where Chattanooga (35° 2' N 85° 19' W.) and Birmingham (33° 37' N 86° 45' W.) are the chief centres

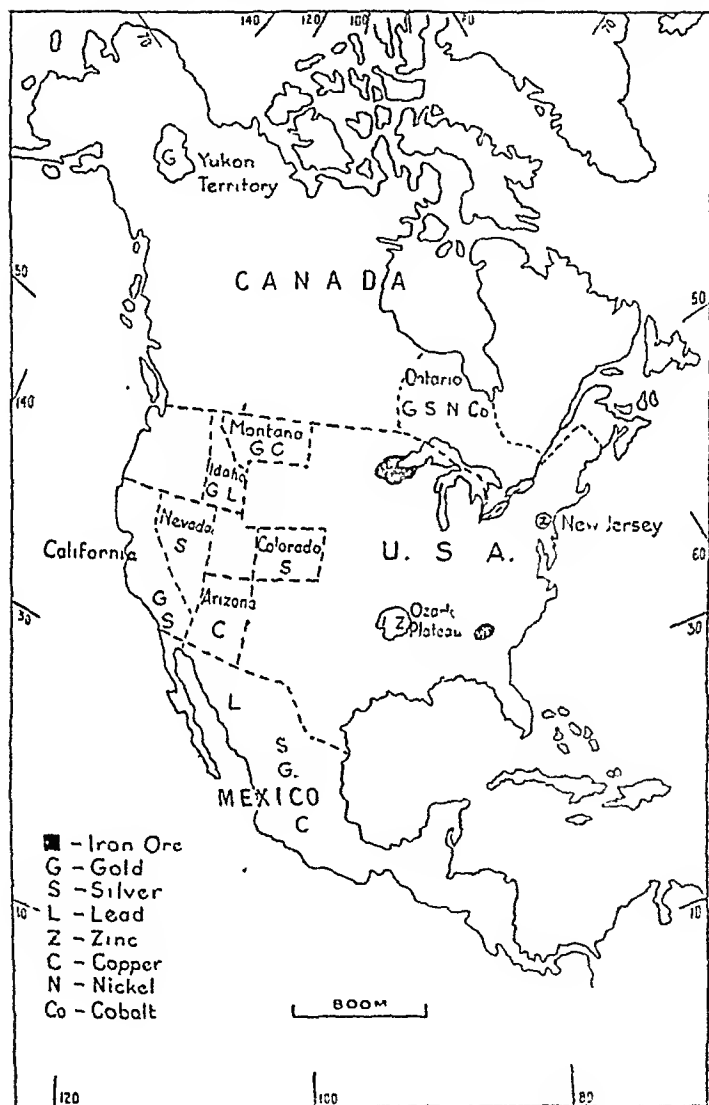


FIG. 35. OTHER MINERAL WEALTH OF NORTH AMERICA

France, with over 20 per cent, comes second and here the chief region occurs in the east of the country—Lorraine (48 40 N 6 0 E). Other centres in France are relatively unimportant.

In Great Britain iron was originally found in conjunction with coal, but these reserves have now been exhausted, and the chief regions producing iron ore are the low hills known as the Lincoln edge (53 25 N 0 30 W.) and the Northampton uplands (52 20 N 0 55 W), the Furness district (south of the Lake district), and Lanarkshire (55 43 N. 3 50 W.) in Scotland. The production of iron ore is considerable, but insufficient for home requirements and considerable quantities are imported, mainly from Spain and Sweden, both of which produce high-grade ores.

Germany, like Britain, produces considerable quantities, mainly in the Westerwald (50 40 N 8 20 E) and Thuringer (50 30 N 11 0 E) forests, but has to supplement her home production by imports. In Europe, other countries which produce small quantities are Luxemburg, Austria, Czechoslovakia, Poland, Russia, and Italy. In Asia, similar small amounts are produced in China (the Yangtze Kiang valley and Shansi) and in India, where the deposits are scattered. Canada produces iron ore in Cape Breton Isle (*Note near coal*), and this is supplemented by production from Newfoundland.

The only producing region of note in the Southern Hemisphere is Iron Knob in South Australia (32 45 S. 137 8 E).

It should be noted that iron ore is only worth mining when it contains more than 33 per cent pure iron.

2. Gold

Originally much of the gold of the world was produced by prospectors who "panned" the mountain streams and found gold which had been washed out of the mountains. The gold rushes to the Yukon (63 0 N 135.0 W) in Canada and to Western Australia were the result of news that gold was to be had for the taking. Very little is now produced by this method, and expensive machinery is necessary.

After mining, the quartz containing gold has to be crushed and subjected to various chemical processes.

The chief place among producers belongs to South Africa, with more than half of the world's output. The Transvaal is the chief area engaged, and Johannesburg (26.15 S. 28 4 E) is an important centre. Rhodesia also produces a considerable quantity.

In the U.S.A. (the second largest producer) gold is found in the Rocky Mountain regions of California, Idaho, and Montana. With the U.S.A. production is included that of Alaska, which, compared with its former pre-eminence, has sunk to insignificance. In Canada the Yukon territory and Ontario produce sufficient gold to make this country the third producer in the world.

Mexico and Australia are also producers of note, although the latter, like Alaska, has lost its former importance.

The remaining metals are of less importance, but you should be familiar with the regions of production, and to help you in this respect the main factors are tabulated. In each case, the producing countries are given in order of their importance.

Silver

<i>Country</i>	<i>Chief mining districts</i>
Mexico . . .	Plateau region to the north of Mexico City.
U.S.A. . . .	Southern California, Nevada, and Colorado
Canada . . .	Ontario.
Peru	The Andean region behind Lima (40 42 N 85 0 W.).
Australia . . .	The Broken Hill region of New South Wales (32 0 S 141 30 E).

Other countries which produce much smaller quantities are Bolivia and Chile in South America, India, Japan, Germany, and Spain.

Lead

<i>Country</i>	<i>Chief mining districts</i>
U.S.A. (nearly half world's total) . .	The Ozark Plateau of Missouri-Arkansas-Oklahoma, and Idaho.

Lead—continued

Mexico	.	The North-western Mountains
Spain	.	The mountainous region of the south-east behind Cartagena (37° 38' N. 0° 55' W.).
Australia	.	The Broken Hill area of New South Wales

Other countries producing lead in small quantities are Canada, India, Belgium, Germany, Italy, France, Great Britain, and Tunisia.

Zinc

<i>Country</i>	<i>Chief mining districts</i>
U.S.A. (nearly half world's output)	New Jersey, and the Ozark Plateau (36° 36' N. 93° 30' W.)
Belgium	South-east region
Poland	Upper Silesia

Other producers are Great Britain, France, Germany, Australia, and Canada

Tin

<i>Country</i>	<i>Chief mining districts</i>
The Malay Peninsula (nearly half world's output)	Widespread throughout the mountains
Bolivia (next in importance)	
Great Britain	Cornwall
The East Indies	Banka and Belitong (two small islands off the east coast of Sumatra).

China, Germany, the U.S.A., and Australia produce smaller quantities

Copper

<i>Country</i>	<i>Chief mining districts</i>
U.S.A. (more than half world's output)	Montana (47° 0' N. 109° 0' W.) and Arizona (34° 30' N. 111° 30' W.).
Belgian Congo	Katanga Plateau

Copper—continued

Chile . . . North of Valparaiso.

Japan . . . The mountain region north of Tokyo.

Other producers are Rhodesia, Canada (mainly in Ontario), Mexico, Peru, Africa, Australia, Great Britain, and Germany.

Nickel and Cobalt

These commodities are produced mainly in Ontario, Canada, where the district around Cobalt-Sudbury (47° 0' N. 82° 0' W.) is of chief importance.

Salt

Ordinary common salt is generally obtained by pumping water into borings and then pumping out the brine formed in the process, but in India considerable quantities are obtained by evaporation of sea water. The chief producers of common salt are the U S A , China, Russia, Germany, and Britain

The chief salt used as a fertilizer is the nitrate deposits of the desert region of North Chile. The exploitation and export of this product is one of the lucrative occupations of the country. In Germany, around Stassfurt, and in Alsace, considerable quantities of potash are produced.

Diamonds and Rubies

Diamonds are obtained from the blue clay of old volcanic areas, and the chief areas of production are in South Africa, where Kimberley (28° 42' S. 25° 0' E.) is an important centre, and the Highlands of Brazil.

Rubies These are found and produced chiefly in Ceylon and the mountainous regions of North-east Burma

Rayon, Artificial Silk, and Plastics

Before the last war rayon and artificial silk were manufactured extensively throughout U S A and Europe. Now the U S A is the leading producer, with Belgium, Great Britain and France producing some.

Plastics were not produced on a large scale before 1939.

Since 1915, however, plastic materials have grown in importance. The U.S.A. and Great Britain are the leading countries, with other European countries following. It is an industry which is likely to develop further.

C FACTORS NECESSARY FOR INDUSTRIAL ACTIVITY

It has already been indicated that coal-fields tend to cause manufactures to be set up; but there are other factors to be considered and the conditions for industrial development must now be considered as a whole. The chief geographical factors which affect manufacturing activities are raw materials, power resources, the demand (or "market") and transport facilities, the supply of labour, and the climatic characteristics. While the problem will be considered under these headings, it must be remembered that the factors are often connected. Further, one region may be lucky enough to possess all the conditions necessary, whereas another may possess only one and yet become important.

1. Raw Material

This is an essential of every manufacture, and may be found on the spot, or it may be necessary to convey it from a considerable distance. When the raw material is of a perishable nature, any industrial activity connected with it must of necessity be carried on near the source of raw material. For this reason, salmon canning is carried on in British Columbia (54° 0' N. 123° 0' W.) and fruit canning in British Columbia and California (37° 0' N. 120° 0' W.). This factor was also the cause of the development of the meat extract industry in Buenos Aires (34° 48' S. 58° 39' W.) and Bahua Blanca (39° 0' S. 62° 0' W.), for the Argentine was a great meat-producing region.

Again the raw material may be very bulky, and the cost of carriage to another region may be great. This is so in the case of the granite-dressing industry of Aberdeen (57° 9' N. 2° 6' W.), where the industry is carried on as close to the quarries as possible.

Pennsylvania to the lake ports of Duluth, Superior, and Ashland. Owing to this fact, iron manufacture has developed at these towns, which are near the raw material and not on the coal-field. Further, at various ports on the lakes, such as Chicago, Milwaukee, Cleveland, and Erie, both coal and iron ore can easily and cheaply be conveyed by water, and in this special case the industry has been established on raw materials and power, which have in both instances been brought over considerable distances. The factors which make this possible are those of transport facilities and the presence of a large local market.

Generally speaking, then, the great coal-fields seem to have attracted many manufactures, a concentration which is referred to as "Centralization." The modern trend, however, would appear to be in the opposite direction, i.e. towards "Decentralization," for with the increasing use of power resources such as oil and electricity, it is not so necessary to take the raw material to the coal-field. As oil can be pumped for great distances, and electricity, whether generated from coal on the coal-fields or from running water, can be transmitted up to 400 miles, power can now be more readily transferred to any particular region where needed, and especially to the raw material needing manufacture.

3. Transport and Markets

In the great manufacturing areas, either raw materials or coal—usually the former—have to be brought from a considerable distance, and cheap transport is necessary. Further, the finished article must be sent to market, and the transport question again arises. Where the coal-field lies near the sea, and the raw material comes from abroad, the ports often engage in manufacture; and where the coal is inland, rivers and canals are used to a considerable extent for bulky commodities, for transport by water is cheaper, if slower, than that by rail. In Lancashire, for example, the Manchester Ship Canal has been cut so as to enable ocean-going liners to come as near as possible to the coal-fields and textile centres.

The Rhine, which serves the industrial areas of

Westphalia (the Ruhr coal-field area of Germany), and the Great Lake routeway of the U.S.A., may be quoted as further examples of transport facilities which have greatly aided the establishment of manufacture

The nature of the commodities carried on the Great Lakes has been indicated above; and it is interesting to note that, apart from the fact that coal can be brought cheaply from Pennsylvania towards the iron resources, there is a further incentive to manufactures around the western end of the lakes. The agricultural activities of the Middle Western plains of the U.S.A. provide a great market for iron and steel articles, and thus the manufactured products of such towns as Chicago, Milwaukee, Duluth, and Superior are closer to this market than those of the Pittsburg area.

Where industries are established well inland, the cheap transport facilities afforded by the sea, rivers, canals, and lakes are generally missing, and the railway is used. Transport costs are thus higher, and such manufacturing regions find it more profitable to manufacture small articles of great value, rather than bulky goods. The transport costs of such valuable articles is, therefore, small, and the costs of carriage make but a relatively small difference to the market price of the article. Switzerland is a case in point. Its raw materials are limited, and, as it is well inland, transport costs are high. The manufactures of this country are, therefore, characterized by the small amount of raw material used and the large amount of labour expended. It is this latter factor which ensures the valuable nature of the articles and enables them to stand the cost of transport. Watches, clocks, and small valuable engineering parts, such as dynamos, are thus typical manufactured products. The Birmingham area of England, similarly placed, is developing more and more along these lines, and now produces mainly precision tools, motor cars and cycles, bicycles, domestic articles, and electrical apparatus. This inland area can be compared with the Northumberland and Durham field, the coastal situation of which enables bulky commodities such as iron ore (imports) and large manufactured iron and steel products (exports) to be moved

cheaply. This area specializes then in heavy iron and steel manufacture.

4. Labour Supply

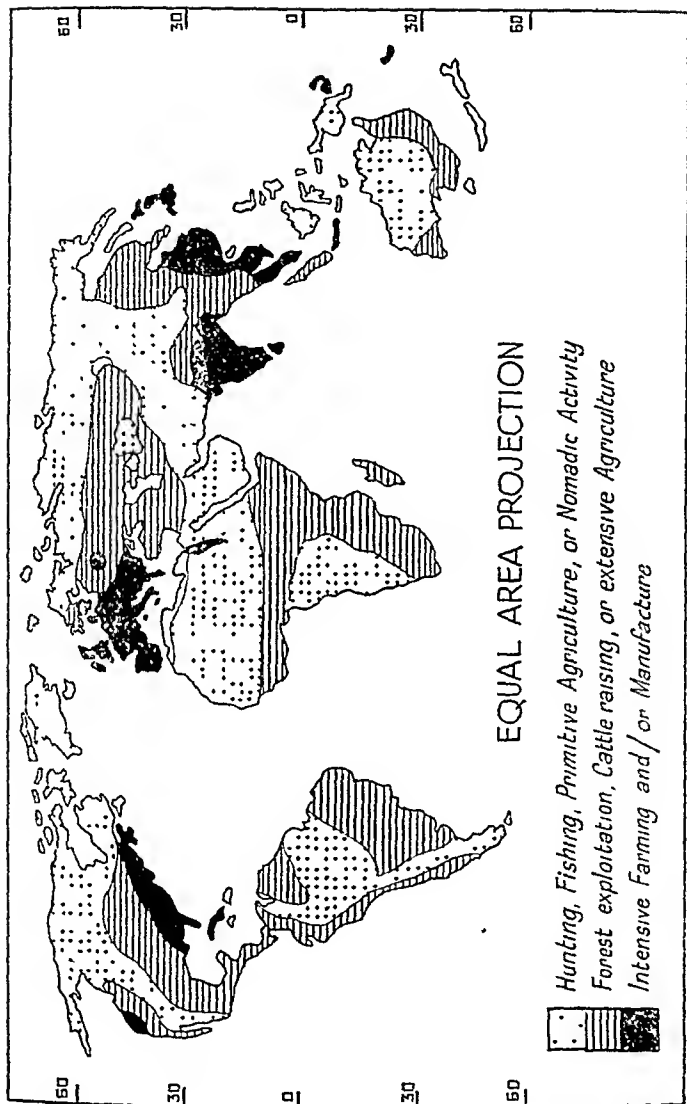
The development of manufactures depends to a considerable extent on labour skilled in technical processes. Over the course of years such specialized skill and efficiency become associated with various areas, and help the other geographical factors to stabilize. In early days of cotton manufacture in Lancashire, for example, the industry was helped to a considerable extent by the influx of skilled textile workers from the woollen centres of Yorkshire. At about this period, too, persecution in Flanders caused many Flemish textile workers to flee their country. They were welcomed by Lancashire, and did much to satisfy the demand for skilled workers.

An interesting example of the importance of skilled labour occurred in the early days of the diamond-cutting industry of South Africa, when diamond cutters were imported from the older established centre of Amsterdam (54° 23' N. 4° 53' E.). The necessity for importing skilled labour can only be dispensed with when a section of the local population has "learnt the trade."

Traditional skill associated with an industry sometimes ensures the continuance of that industry in a certain locality, even after the geographical factors which localized the industry cease to exist. Sheffield (53° 24' N. 1° 27' W.), for example, built up its high grade steel and cutlery manufacture on its local resources of high grade iron. These resources have long been exhausted, but although its iron ore has to be imported, Sheffield retains its pre-eminence largely owing to its supply of labour skilled in the required processes.

5. Climate

Special characteristics of climate may account for the success of an industry. Cotton spinning, for example, demands a moist climate, for the thread breaks in a dry atmosphere. Lancashire has a heavy rainfall, and thus possesses the climatic characteristic necessary for cotton



manufacture. Nowadays the humidity in the cotton sheds is controlled mechanically. Note, however, that the industry is not established here because of this fact alone. The chief geographical factors which caused the establishment of cotton spinning in Lancashire were the power resources and labour supply; but it can be said that the moist air helped in the formation of the industry. Japan is similarly placed in a fortunate position for cotton manufacture with regard to climatic conditions. At the present day the moist air necessary can be produced artificially within the factory, and thus cotton mills can be established in drier climates. Thus, it has been possible for Bombay (18° 55' N 73° 0' E) to develop cotton manufactures, using the raw material grown immediately inland.

The establishment of the film industry in Hollywood (California) resulted from climatic characteristics; for the clear sunny climate experienced there was well suited to photography. The increased use of studio effects renders this factor less potent at the present time, and films are being made on an increasingly large scale in England.

When once an industry is built up in an area, it tends to remain there even if other areas possess equal geographical advantages. This is due in the main to the human factors, for money has been spent on the establishment of works, markets have been established for the products of the factories, and specialized skilled labour is abundant. Sheffield may be quoted as an example, for, as already pointed out, the iron deposits upon which the industry was founded are exhausted, but the industry, once built up, continues to exist. Such a phenomenon is referred to as "*Geographical Inertia*."

D HUMAN SETTLEMENTS

1. Distribution of Population

Examination of a population map of the world will bring out the fact that over very extensive areas very few people exist, while in other, much smaller regions, many millions are able to live. The distribution of population is closely allied to geographical characteristics such as position,

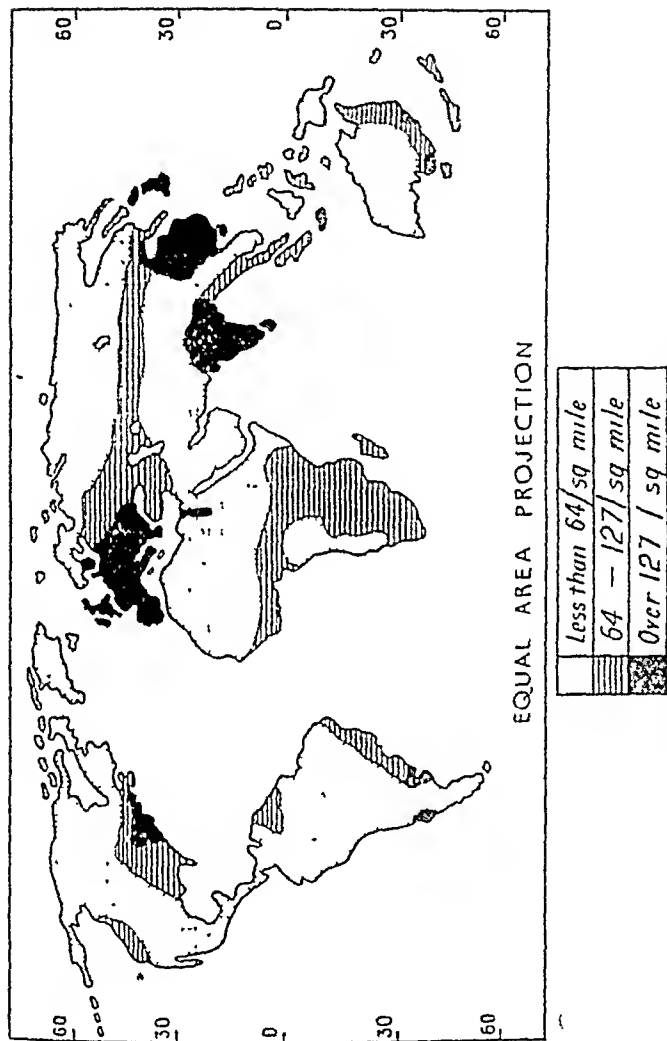


Fig 38. DENSITY OF POPULATION (GENERALIZED)

climate, soil, mineral wealth and the possibilities of manufacture, and in studying this section the facts indicated in the earlier parts of the chapter, and in Chapter IV, should be borne in mind. Constant reference must also be made to Figs. 24 and 37.

VERY SCANTILY PEOPLED AREAS (less than 64 per square mile)

Areas included in this category are the *desert regions* of the world. Here the only possible means of existence is either a nomadic one, or cultivation and settlement in the few oases. Vast areas are almost entirely uninhabited.

The *Tundra regions* are similar, for the fishing and reindeer keeping activities engaged in by Tundra peoples can support but a sparse population. Where unexploited, the great forest regions of the cold temperate and the equatorial regions support but a very limited population, which exists chiefly by collecting tree produce, trapping, hunting, and a little primitive agriculture. The high mountainous regions of the world can support but very few people.

THINLY PEOPLED AREAS (64-127 people per square mile)

Where the forests of the world are being commercially developed, and in those parts of the world's grasslands which are given up to cattle raising, or extensive cultivation, an increase of population is found. Parts of Central Asia, the Sudan and Highland regions of Africa, the western parts of Argentina and the Orinoco valleys of South America, the West Central plains of North America, and the western parts of Queensland and New South Wales are all regions thinly populated.

FAIRLY DENSELY PEOPLED AREAS (128-256 per square mile)

A population of this density is generally found in those areas which have been given up to more intensive farming than that practised on the great grasslands of the world. The chief areas of this type are the fertile agricultural lowlands of Great Britain and the other European countries, the regions of the world with a Mediterranean type of

climate, North Eastern U.S.A., and the St. Lawrence region of Canada; and much of the monsoon countries.

DENSE POPULATIONS (over 256 per square mile)

Where, as in river valleys and coastal situations of the monsoon lands, agriculture is very intensively practised to such an extent that many crops of rice can be taken from the same patch of ground in a season, a very dense population indeed can be supported on agriculture alone. In the most thickly peopled districts, densities of over 500—and even 1000—people per square mile are not uncommon. Java, an equatorial island which has been cleared of its forests and exploited agriculturally, also has a dense population. It is computed that over 55 per cent of the world's population lives in South-east Asia.

Manufacturing activities also give rise to dense populations, and thus it is not surprising to find that, outside South-east Asia, the most densely peopled areas are on or near the main coal-fields. The industrial areas of Great Britain, Western Europe, and North-eastern U.S.A. may be given as examples.

2. Human Settlements : Town Sites and Ports

The factors which cause the development of towns are many, and must now be considered.

TRADE CENTRES (other than ports)

In agricultural regions towns develop in central situations in order that the produce may easily be brought to market from a wide area. These towns, to cater for the needs of the agricultural populace, develop shops, transport facilities and recreations, as well as a market, and thus work of a nature differing from that common in the surrounding region is found. Where a town is centrally situated with regard to a large area (such as a county in England), it is not unusual to find that it develops as the main market and administrative centre—or county town. Norwich and York may be quoted as examples. In Canada, Edmonton, which is centrally situated in Alberta, acts as the chief wheat-collecting centre and market for that province.

Towns also develop in areas associated with mining and manufacturing activities. During the gold rushes to Australia and Alaska, towns on the gold-fields, such as Coolgardie and Dawson City, grew to considerable proportions, only to sink back into insignificance when these producing regions became of less importance. Of the more permanent centres of population dependent on exploitation of mineral

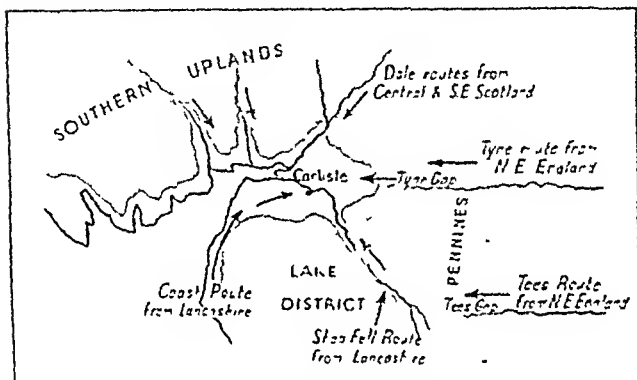


FIG. 39 POSITION OF CARLISLE

wealth of the surrounding district may be mentioned Johannesburg in South Africa (centre of gold mining industry). Manufacturing industries and trade demand market centres for the buying of raw materials and for the sale of the finished articles, together with facilities for the workers. Most of the large towns of the world are connected with industry. In Lancashire and Yorkshire, such towns as Oldham, Bolton, Bury, Huddersfield, and Bradford owe their development mainly to the textile industries, while, in Warwick, Birmingham developed on its local iron and coal resources as a producer of iron and steel goods needed by farmers of the surrounding country.

ROUTE TOWNS

Towns grow at the meeting place of routeways. Carlisle (54.53 N 2 56 W), for example, grew up at the junction

of the route from the dales of Scotland to the Eden valley and Lancashire, and that of the Tyne gap to North-east England. Thus Carlisle has become an important road and rail centre. In Canada all the railways conveying the wheat produce of the prairies to the Great Lakes (for transport to the east coast) meet near the southern shores of Lake Winnipeg; and as a result of this meeting of railways the town of Winnipeg (50.0 N. 97.5 W.) has developed as a major wheat market and collecting centre.

Farther on, the wheat has to leave the railway for ship-

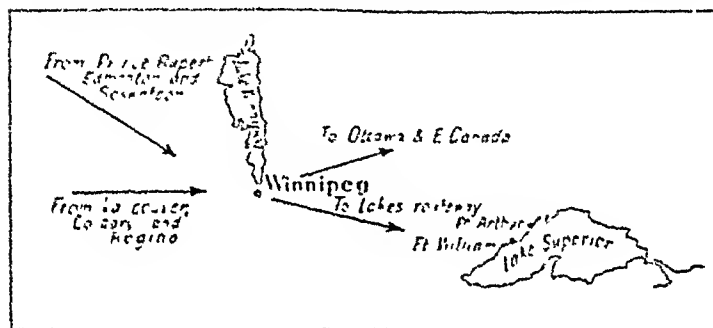


FIG. 40. POSITION OF WINNIPEG

ment on the Lakes, and this has resulted in the development of towns such as Fort William and Port Arthur. Examples of towns in the U.S.A. which have developed owing to a similar break of transport are Buffalo, Erie, and Cleveland, along the shore of Lake Erie (42.0 N. 81.0 W.). Basle (47.34 N. 7.35 E.) in Germany and Strasbourg (48.35 N. 7.41 E.) in France are situated where road and rail routes from Central Europe meet the Rhine route to the sea. This hints at the importance of rivers as a cause of town sites. The necessity for bridging the rivers Thames and Rhine was the original cause of settlements which developed into London and Cologne (50.55 N. 6.58 E.). While it must be remembered that other factors may have contributed towards its growth, it is instructive to notice that almost every capital town of Europe is constructed on a river. Towns often develop also where railways cross the river,

and Pittsburg (40.30 N. 79 52 W.), in Pennsylvania, may here be quoted as an example. Further, the meeting of routes resulting from the junction of streams produces town sites, as an example of this may be cited Lyons (45 46 N. 4 50 E), in France, which is situated at the junction of the Rhône and Saône. Paris owes its development and importance largely to the fact that it is the focal point of the routeways along the upper tributaries of the Seine.

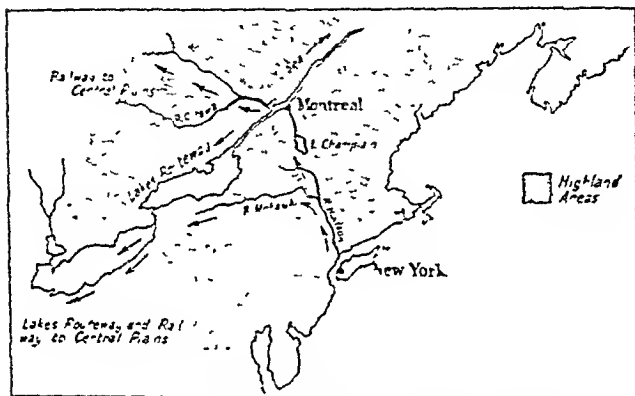


FIG 41 POSITION OF NEW YORK AND MONTREAL

PORTS

The estuaries of rivers are common sites for towns, for here goods intended for export change from river, rail, or road conveyances to ocean-going vessels, and a "port" is necessary. Many of the great ports of the world are on river estuaries (e.g. London, Hull, Liverpool, Glasgow, Hamburg, and New York), for the river valleys provide easy communication from the port to the area inland which provides goods for export or is prepared to buy the imported goods. Such an area is called the "Hinterland" of the port. There are thus two main requirements for the formation of a large port, viz. it must be backed by a productive hinterland which provides a surplus of goods for export and needs goods provided by other countries

(imports), and good communications must exist between the port and its hinterland. Liverpool and Manchester, for example, are backed by the densely peopled textile region of Lancashire, a region which produces manufactured cotton goods for export and demands imports in the form of raw materials (such as cotton) and food. This great trade, combined with excellent communications in the form of railways and the Manchester Ship Canal, enabled Manchester and Liverpool to become important English ports. Melbourne is a good example of a port flourishing on the basis of its rich farming hinterland, although its position is off the main trade routes.

The positions of New York and Montreal also illustrate the importance of communications inland.

The Appalachian Mountains in Eastern U.S.A. make communication from the coast to the interior very difficult, but New York is fortunately situated in that it controls the Hudson-Mohawk routeway, which gives communication by road, rail, river, and canal to Canada (Montreal), the Great Lakes, and Central U.S.A. Montreal, situated well upstream on the St. Lawrence, has easy communication with the interior plains of Canada by means of the river and the Great Lakes. Rio de Janeiro and Bombay, to mention but two examples, are not so fortunately placed, for both have mountain systems immediately behind them, and communication inland is difficult. Such barriers tend to make the hinterland less extensive, and the port of less importance.

Where the port is situated on a river estuary the silt brought down by the river and deposited in the mouth must be cleared away, or the mud and sand deposits formed would prove dangerous to shipping. Where this is done naturally by the tides, e.g. London and Southampton, the ports have an advantage, for in other cases when the estuary has to be cleaned by dredging, e.g. Glasgow and Ostend (Belgium), the cost incurred is often considerable. In almost tideless seas, where deltas are formed, it is found that the port of the region is not on the river itself, but at some distance to one side, e.g. Alexandria (to the west of the Nile delta) and Marseilles (to the east of the Rhône delta).

Further, a port should be sheltered from the force of storms and rough seas, and points lying behind headlands and on the leeward sides of lands are fortunate in this respect. Hull, London, Southampton, and Glasgow are ports which exemplify this characteristic.

Tampico, one of the main ports of Mexico for export of

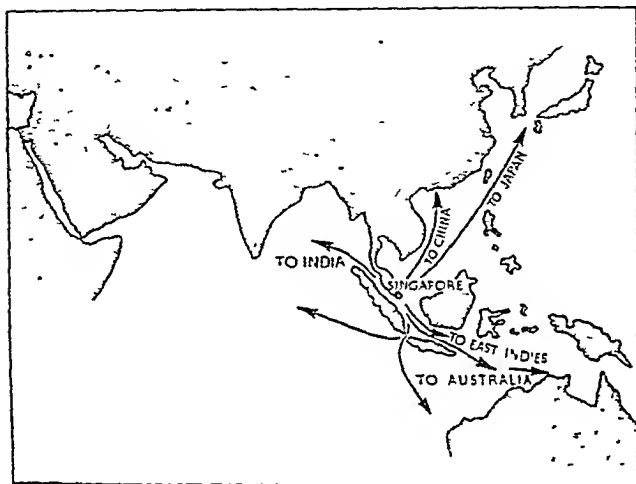


FIG 42 POSITION OF SINGAPORE

petroleum, is unfortunately situated, for its open situation exposes shipping to the full force of tropical winds and storms. The loading of a tanker with oil is thus often a risky and difficult process.

Ships need coal or oil, and a port which can supply these commodities will attract shipping. Lourenço Marques (26° 0' S. 32° 42' E) and Sydney are coaling stations, for their hinterlands include coal-fields, while Melbourne and Adelaide may be contrasted in that, being distant from coal resources, they do not possess this particular attraction for shipping.

A port may be constructed in a strategic position as a

warship base Gibraltar and Malta, two key positions in the Mediterranean, are good examples.

Generally speaking, the ports considered have been such as depend on the imports and exports of the land behind the port, i.e. the hinterland. Where a port is centrally situated, however, it may act as the collecting centre and market for the produce of a large area, such produce being later transhipped to other regions. This type of port is known as an *entrepôt* (between port) port, and the trade engaged in is called *entrepôt* trade.

Singapore (1.0 N 104 30 E), in the Malay Peninsula, is centrally situated with regard to South-east Asia, the East Indies, and Australia, and acts as the collecting and distributing centre for much of this area. Here is a port, with half a million people, which depends almost entirely on its *entrepôt* trade.

The commercial importance which London has attained, and the fact that it attracts ships of all nations, has resulted in the fact that it, too, engages in much trade of this nature.

ATLAS STUDY AND REVISION

Make sure that you can mark, accurately, on blank maps, any of the following—

- (a) The main coal-fields and oil-fields of the world.
- (b) Areas of water power development.
- (c) Areas of production of iron ore, gold, silver, lead, zinc, copper, nickel, and cobalt, salt, diamonds, and rubies.

EXERCISE 5

(1) Discuss the factors which help to establish manufacturing centres. Quote examples whenever possible.

(2) Select one scantily peopled region and one densely peopled region, and discuss as fully as you can the factors which have resulted in this distribution.

CHAPTER VI

TRANSPORT AND COMMUNICATIONS

In a very few areas to day can man provide all the necessities of life, and goods, in the form of either foodstuffs or manufactured articles, must be brought from other areas. Such trade, or commerce as it is called, cannot exist without transport facilities, and it is with these methods of movement that we have now to deal. On land, these methods vary with the nature of the country and the type of goods carried, and while the railways are of chief importance, other methods are still of value and interest. The great railway routes of the world will be dealt with in connexion with the main countries (Chapters VII-XIII).

Once again the importance of atlas study, and the value of being able to mark subject-matter on blank maps, must be stressed, the insertion of routes and methods of transport on blank maps of the world is a very popular type of question in modern examinations. You would do well, then, to refer to your atlas for every statement made.

1. TRANSPORT (OTHER THAN RAILWAYS) ON LAND REGIONS

1. Human Carriers

These are chiefly found in regions where the climate or vegetation—or both—make the construction of roads difficult, or where animals cannot be kept. In the equatorial forests and savanna regions of Africa and South America negro porters are important, while in densely populated South-eastern Asia, coolies transport both commodities and persons. The Chinese wheelbarrow and the Japanese rickshaw are characteristic vehicles which depend upon human power. This human transport in the East is the result of large populations, for all the food grown is used by human beings, and there is not sufficient for “beasts of burden.” Again, the large population results in the plentiful supply of cheap labour.

2. Animal Transport

In much of Europe and North America the horse has been for centuries the chief “beast of burden”, and

although its value and importance has now decreased owing to the development of rail and motor transport (which eliminated the old "coaching" method), it is still of value, especially in agricultural districts, for conveying goods over short distances. The horse, it should be noted, is confined chiefly to the cool temperate climatic regions.

The camel, on the other hand, is undoubtedly the "ship of the desert"; for its ability to exist without food and water for a week, and to live on the scanty desert vegetation, renders it of great value in the Sahara, Arabian Desert, Gobi, and the Thar Desert of North-west India. In Western Australia some camels are used, but here they are of less importance.

Mules and donkeys represent a "half-way stage" between horse and camel, for while they can exist and work on poorer foods and more difficult ground, e.g. hilly regions, than the horse, they cannot endure the hardships experienced by the camel in the deserts. They are thus very well suited to the climatic and ground conditions of regions experiencing the Mediterranean type of climate. In the Mediterranean countries of Europe are found nearly half of the mules and donkeys of the world, while other regions where these animals are greatly used are South-east United States, South Africa, and Argentina.

Unlike the camel, the ox and buffalo can endure a moist as well as a hot climate, and thus these animals are of great value in a country such as India. Outside the forested regions of this country, oxen are kept, almost entirely as beasts of burden, in very large numbers, and result in a large export of hides. In Russia, the northern countries of South America, and South Africa, the ox and buffalo are also important.

In the monsoon forests of India and South-east Asia the elephant is used for heavy transport, such as that necessary for the movement of the heavy logs of the valuable hardwoods, e.g. teak.

Dogs are used chiefly in the tundra regions of North America and North Eurasia, where a team of "huskies" can draw loads of 1000 lb. for considerable distances over

the snow. Reindeer, which can exist on the poor vegetation found in the tundra, are also of value here, as well as in the northerly regions of the coniferous forest belts.

Other animals which are used for transport in more limited regions are the llama and yak, which, being hardy and sure-footed, are well suited to mountainous regions. The llama is to be found in considerable numbers in the Andes of Peru and Bolivia, while the yak is confined to the mountains of Central Asia.

B INLAND TRANSPORT BY WATER

In regions where roads and railways have not been greatly developed, such as the equatorial forest regions of Africa, South America, and South-east Asia, the rivers provide great arteries by which men can penetrate into the inland regions, and by which the produce of the interior can be sent down to the coasts for export. The Congo, Amazon, Ganges, Irrawaddy, Yangtze Kiang, and Hwang Ho are examples to be noted in this connexion. Even in those regions where road and rail development has reached a high level, river and canal transport is important, for while conveyance of goods by the latter methods cannot compete in speed and "flexibility" (i.e. the ability to serve at any time any part of the country) with road and rail methods, they possess the advantage of being able to transport goods, especially those of a bulky nature, much more cheaply. Heavy non-perishable goods, such as coal, iron ore, timber, and corn are often sent considerable distances by these methods. In North America, for example, the great lakes and St. Lawrence waterway system are used for the transport of wheat and iron ore to the eastern states and ports, while coal and manufactured articles are sent in the opposite direction. The Great Lakes system is linked with the Hudson-Mohawk rivers' routeway by the Erie Canal (See Fig. 41). The tonnage of commodities transported annually on this route is about four times that which is sent through the Suez Canal, which links the Mediterranean and Red Seas. A disadvantage of the St. Lawrence lies in the fact that it is blocked by ice during

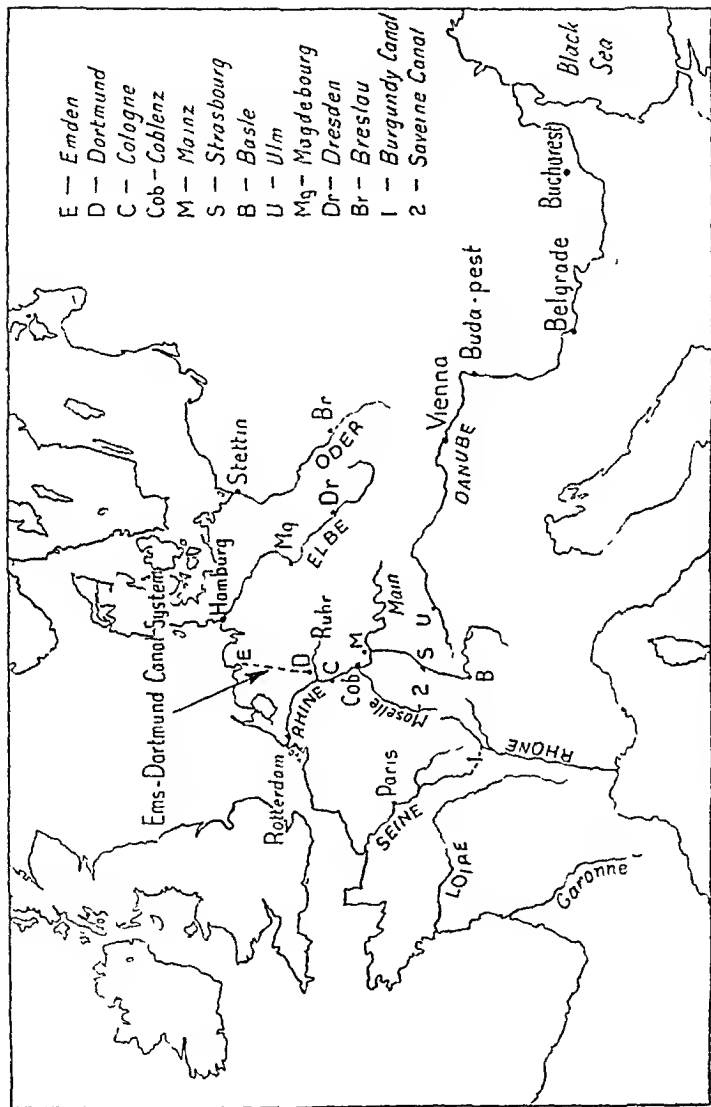


FIG. 43. MAIN NAVIGABLE RIVERS OF EUROPE

the winter. In North America another river system which also conveys considerable quantities of goods is that of the Mississippi and its tributaries, for although the mouth is blocked by a delta, river steamers can reach St. Paul (45° 5' N 93° 15' W) and Pittsburgh. In South America the Parana and Uruguay, which combine to form the La Plata estuary, are of great value, for this system serves the developed regions of Argentina, Paraguay, and Southern Brazil. Rosario (33° 10' S 61° 0' W), Santa Fé (35° 48' N. 106° 0' W), and Asuncion (25° 40' S 57.35° W.), the last-named being nearly 1000 miles inland, are all important river ports. Buenos Aires is the chief seaport.

In the lowland regions of Europe rivers are of great importance, and must be considered in more detail.

1. The Rhine

This is undoubtedly the most important river of Western Europe, for in its course it serves highly developed and densely peopled countries such as Switzerland, France, and Germany, all of which are engaged in manufacture and, therefore, need to export industrial products and to import raw materials and food. This necessity for trade gives the river its importance, but a disadvantage to these countries lies in the fact that the Rhine flows through Holland before reaching the North Sea. Holland is lucky in this respect, for Rotterdam (51° 55' N 4° 30' E) thus gains control of the immense trade of the Rhine. Germany has attempted to keep part of this transport trade within her own boundaries, and with this end in view she has used the river Ems and constructed the *Ems-Dortmund Canal*.

The ports upstream which can be reached by boats vary with the season and with the size of the vessels used. Generally speaking, however, river steamers can reach Strasbourg (48° 35' N 7° 40' E), while barges can go on as far as Basle, almost on the Swiss boundary. Other important river ports on the Rhine waterway system are Duisburg (51° 25' N 6° 50' E), which serves the highly industrialized Ruhr coal-field area, Cologne, Coblenz (at the junction of the Rhine and the Moselle), and Mainz (at the junction of the Rhine and the Main).

2. The Elbe and the Oder

These are two other important German waterways, for the former can be used for transport of goods from the sea at Hamburg (53 33 N. 9.58 E) to such important inland towns as Magdeburg (52 8 N 11 35 E.) and Dresden (51 0 N. 13 42 E.). This route is used to a considerable extent by North-west Czechoslovakia (Bohemia). To the east lies the Oder, which also rises in Czechoslovakia, but flows out to the Baltic Sea, serving the port of Stettin (53 27 N. 14 30 E.). Herein lies a disadvantage, for the continental situation and the fact that the river enters into an almost enclosed sea cause the river to be frozen over during the winter. In spite of this, the river is navigable for considerable distances inland during most of the year, and serves the important mineral (coal) region of Upper Silesia, where Breslau (51.2 N. 17.0 E.) is an important town.

(N.B. The main rivers of Germany flow from south-east towards the north-west, and thus engineers have found it easy to construct canals from east to west. These help to make river transport in Germany of even greater value)

3. Rivers of France

The larger rivers of France, viz. the Seine, Rhône, Loire, and Garonne, are all navigable for considerable distances inland, and since they flow for long distances across fairly level land, canals, as in the case of Germany, can be constructed to link up these navigable waterways. The chief canals are. (a) the Burgundy Canal, which connects up the Yonne (a tributary of the Seine) and the Saône (a tributary of the Rhône), and (b) the Saverne Canal, which connects up the Moselle at Nancy (48 40 N 6.8 E.) and the Rhine at Strasbourg. There is canal communication between Nancy and the Seine headstreams, and the Yonne, Loire, and Garonne are similarly connected. These factors indicate the value of canals, and further consideration may with advantage be interpolated here.

4. Canals

Near the Rhône mouth a canal is being constructed for a reason other than that of connecting up navigable rivers.

The river opens out into a delta, and this makes it unnavigable from the sea. The construction of a canal from Marseilles (43 18 N 5 20 E) to Arles (43 40 N 4 40 E.), above which the river is easily navigable to Lyons, is in hand. Another example of a canal constructed to avoid obstacles in a river system occurs in North America, where the Welland Canal (43 0 N 79 12 W.) skirts the Niagara Falls, and thus makes possible water communication between Lake Erie and Lake Ontario.

The advantages gained by water transport has also prompted the construction of canals in regions not well served by rivers. In the industrial coal-field area of north-east France, Holland, and Belgium, a network of canals has thus been built up. One further reason for canal construction is the advantage of linking up seas, and in Europe this is evidenced by the Kiel Canal (54 17 N. 9 40 E.), which, constructed across the narrow strip of territory south of Denmark, gives easy communication between the North Sea and the Baltic Sea. By this means is eliminated the necessity of making the journey round the north of Denmark. Other more important examples are the Suez and Panama canals, which will be dealt with more fully in the section on ocean transport.

5. The Vistula

The Vistula, the great highway of Poland, follows the general trend of North European rivers in rising in the central mountains and flowing in a north-westerly direction through much of its course. Its great value lies in transporting the produce of the great coal-field round Cracow (50 6 N 20 0 E) to the sea, and imported goods in the opposite direction. Further, its general trend towards the north-west renders easy canal communication from Bromberg (on the lower Vistula) to the tributaries of the Oder. Disadvantages lie in the fact that in the central and lower courses the river is liable to flooding; moreover, as in the case of the Oder, the river is closed for several winter months by ice.

6. The Danube

The Danube ranks next in importance to the main rivers

of France and Germany as a European waterway. Rising in the mountains of South-west Germany, it flows through Austria, Hungary, Yugoslavia, and Romania. It can be navigated by barges from Ulm (48° 25' N. 10.0° E.) down to the Black Sea, and by sea-going vessels along that part of the river lying in Romania. While this river is very important, however, its value is greatly decreased by the fact that it opens into the Black Sea, which is far removed from the world's great shipping routes and, in addition, the continental situation renders the lower river unnavigable owing to ice for two months in the winter. On or near the Danube lie many important towns and river ports, the chief of which are Vienna (48.10° N. 16° 20' E.), Budapest (47.30° N. 19.3° E.), Belgrade (44° 47' N. 20.34° E.), and Bucharest (44° 25' N. 26.2° E.). The last-mentioned town is set back from the river owing to the marshy nature of the country near the river banks.

7. The Russian Rivers

These rivers, of which the most important are the Volga, Don, and Dnieper, flow mainly across extensive plains and are, therefore, navigable for tremendous distances. The importance of these rivers is decreased greatly, however, by the fact that they are frozen over for considerable periods during the winter. Again, the Volga flows into the Caspian Sea, and not to the open sea. The Don and Dnieper are of more value, for they flow, like the Danube, into the Black Sea.

(N.B. Examples have not been chosen from the British Isles, for river and canal communications in our lands will be more fully dealt with in Chapter XIII.)

C OCEAN TRANSPORT

Ocean transport can be divided into two main types: (a) that engaged in by liners, which generally follow a set route and time table; and (b) that of tramp steamers, which journey irregularly from port to port, delivering and picking up any available cargoes. The regular liners, i.e. (a), can be further divided into two types, those which

engage in transport of passengers and mails, and those which specialize in transport of certain commodities along set routes. These latter vessels, known as freight liners, convey, for example, agricultural produce from Australia to England, and manufactured textiles and machinery in the reverse direction. Other examples can be found along all the main shipping routes, and it is with these routes that we have to deal.

Before going into details, however, one principle must be considered—the principle known as **Great Circle Sailing**. If possible, examine a globe or a large sphere, such as a football, in connexion with the following explanation. A *great circle* of any sphere is a circle which has for its centre the centre of the sphere, that is, a great circle is a plane of the sphere passing through its centre. In the case of the earth (regarded as a sphere) the Equator and the meridians (lines of longitude) are great circles. The shortest distance on the surface of the earth between two places is along the circumference of a great circle. Unless both places had latitude 0° , this would, of course, be inclined to the horizontal great circle, the circumference of which is the Equator. The Great Circle distance between the two places can be roughly indicated by stretching a string on a globe. Great Circle Sailing, practised since the sixteenth century, is an attempt to keep as closely as possible to the circumference of a Great Circle. In point of fact, however, in order to avoid dangerous latitudes, the navigator cannot steer always to the Great Circle, and has to take a number of courses that are roughly tangents to the Great Circle, crossing the various meridians at different angles, and never heading directly for the destination. This entails sailing north of the Great Circle in the Northern Hemisphere, and south of it in the Southern Hemisphere.

1. The Atlantic Routes

NORTH ATLANTIC

Here the chief lines are mainly east-west, connecting Europe with Canada, U.S.A., and Central America. Ships engaged in North Atlantic transport practise Great Circle

and Quebec to Europe can use the full Great Circle route, and in so doing proceeds to the north of Newfoundland

On the American side the chief ports engaged in transatlantic shipping are New York, Halifax, and Montreal, while others of lesser importance are Philadelphia (39.55 N. 75 18 W) and Baltimore (39 25 N. 76 40 W). Shipping lines from Central America and the West Indies often follow the American coastline for a considerable distance before turning eastward to take advantage of the Great Circle routes. The chief traffic eastwards is in passengers, foodstuffs such as wheat and meat, and raw articles for manufacture, such as cotton, timber, and petroleum

On the European side, the chief ports involved are Liverpool, Southampton, Cherbourg (49 36 N. 1 38 W.), Havre (49 30 N. 0 8 E), and Hamburg

The passenger traffic from these ports westward was previously considerable, but of recent years there has been a change from emigrant traffic, with its great third-class and steerage facilities, to tourist traffic. The demand of the New World for European manufactured produce is not sufficient to supply the westward bound freight steamers with cargo, and many return in ballast. While there are no intermediate coaling ports between America and Europe, the termini in most instances have coal easily available and the coaling difficulty does not arise. Further, the U S A is a huge producer of oil, and this form of power is now being used in increasing quantities

Another route which deserves mention is the direct route from Europe to the West Indies and Central America. This route—not a Great Circle—has increased in use with the rising importance of the Panama Canal. The chief ports engaged are Havana (Cuba), Kingston (Jamaica), and Colon (for the Panama Canal). In 1929, Churchill, on Hudson Bay, was connected by railway with the wheat-producing plains of Canada, and considerable quantities of wheat are now exported from this port. This traffic to Europe joins the main stream of eastward bound vessels off Newfoundland.

The chief shipping companies on the North Atlantic routes include the Cunard White Star, Hamburg-America,

North German Lloyd, the Canadian Pacific, and the C G T. (i.e. Compagnie Générale Transatlantique).

SOUTH ATLANTIC

The eastern countries of South America, especially Brazil, Uruguay, and Argentina, produce many tropical and temperate agricultural crops which are in great demand in the densely peopled industrial areas of Europe and North-eastern U.S.A. Further, these South American countries have little coal and do not engage in the manufacture of engineering and clothing requirements. Thus there is here the necessity for large scale transport, and the sea route from Eastern South America to Europe and the U.S.A. is the third in importance of the traffic routes in the world.

In Europe and North America the chief ports engaged in traffic with South America are similar to those used by North Atlantic shipping; and export manufactured commodities, e.g. cotton, wool, iron and steel goods to large ports such as Rio de Janeiro (22 50 S. 43 44 W.), Montevideo (34 38 S. 55.50 W.), and Buenos Aires. In addition to manufactures, North-west Europe also exports large quantities of coal. In the opposite direction cargoes consist largely of coffee from Rio de Janeiro, and cereals, especially wheat, wool, meat, and hides from Montevideo and Buenos Aires. Before the opening of the Panama, shipping from the Pacific ports of America used the routes round Cape Horn and the Magellan Straits, but the volume of this traffic has now decreased considerably.

In dealing with the freights of the North Atlantic, it was mentioned that the volume of traffic from North America to Europe is greater than that in the reverse direction, with the result that many ships have to travel westward in ballast—a costly process. Many British ships eliminate this waste of a journey by travelling to South America with manufactured goods and coal, coasting northwards to the U.S.A. with agricultural commodities, and then returning to Europe with North American produce. The chief shipping company using the South American route is the Royal Mail Steam Packet.

(*N.B.* Both from American and European ports there is a considerable volume of traffic to the Mediterranean, but most of this is through-traffic to the East, and will be considered with the Eastern routes.)

THE ATLANTIC ROUTES TO AFRICA

Trade between industrial U.S.A. and Europe on the one hand, and Africa on the other, is similar in nature to that considered in the case of South America, viz. the exchange of manufactured goods for raw material. The main routes are from New York to Capetown (direct) and from European ports to Madeira (32° 55' N. 16° 39' W.), Tenerife (28° 15' N. 16° 20' W.) and Capetown. In addition, many vessels coast along Western Africa in search of cargoes. From Capetown itself are exported wheat, fruits such as oranges and peaches, wine, wool, gold, and diamonds. From ports along the west coast, such as Loango (4° 35' S. 11° 55' E.), Lagos (6° 26' N. 3° 38' E.), and Freetown (8° 19' N. 13° 10' W.) are exported equatorial produce such as cocoa, palm oil and ground nuts, mahogany and ivory. From Tenerife (Canary Islands) the chief exports are bananas. Here it may also be mentioned that the Canaries and Madeira are important coaling stations. The routes from U.S.A. and Europe to Capetown form part of the Cape route, as it is called, to Eastern Africa, Asia, and Australasia—one of the eastern routes to be considered later.

2. The Pacific Routes

Here, as in the Northern Atlantic, the steamship services make great use of Great Circle sailing, and an interesting example of this is shown by the route from Panama to Hong Kong (22° 20' N. 114° 10' E.) and South China generally. The shortest distance between these ports, is not, as one might suppose from an atlas map, via the Hawaiian Islands and Honolulu (21° 18' N. 157° 50' W.), but via San Francisco (37° 40' N. 122° 25' W.) and then along the Great Circle route. The use of Great Circle routes in the Pacific results, as in the case instanced, in the fact that vessels travel for considerable distances along the seaboard on either side, and can, therefore, engage in considerable coasting trade.

In the Pacific, too, the old sailing vessel routes are sometimes followed as alternatives to the circle routes. When this is done, the vessels sail westward within latitudes 10° – 25° N., using the trade winds and the equatorial current, coast northward along Eastern Asia, and then follow the

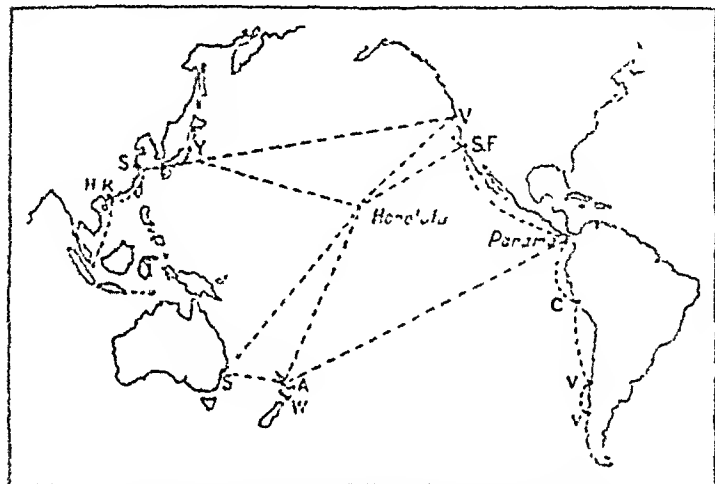


FIG. 45. MAIN SEA ROUTES OF THE PACIFIC

Identify each of the main ports, indicated by initial letters, and note from the text the chief trade characteristics of each

Westerlies (and the Great Circle route) back to North America.

The combination of these factors results in the establishment of well-defined routes. The chief route lies between the ports of San Francisco and Vancouver ($49^{\circ}12'N$, $123^{\circ}0'W$.) on the American side, and Yokohama ($35^{\circ}25'N$, $139^{\circ}35'E$.) and Shanghai ($31.15^{\circ}N$, $121.35^{\circ}E$.) on the Asiatic side. Coaling ports are Yokohama, Shanghai, and San Francisco. This last-named port imports considerable coal for fuelling purposes from British Columbia, but is even more advantageously placed for supplying oil, owing to the proximity of the Californian oil-fields.

There are also important routes from the western shores of North America to Sydney in Australia, and to Auckland

in New Zealand, and direct from Panama to Yokohama and Australasia respectively. For the northern routes, Honolulu is an important port of call and coaling station.

In the North Pacific the commodities moving westward from the western shores of North America and the Panama are raw materials, such as timber and raw cotton, and manufactured goods such as textiles and machinery; while commerce in the opposite direction consists largely of monsoon and tropical crops in which North America is deficient, e.g. rubber, rice, sugar, tea, and silks. Trade with Australasia consists mainly in the exchange of manufactured textiles, and machinery for agricultural produce—wheat, meat, dairy produce, and fruit. The proportion of Australia's trade across the Pacific, however, is small compared with that across the Indian Ocean. South America, too, is but little interested in transpacific traffic, for while the Cape Horn route from the Atlantic to Wellington (41° 17' S 174° 45' E) is still used, it is comparatively unimportant. Much of the trade of Western South America, which consists in the export of raw materials such as nitrates, minerals, and wool, and the import of manufactures, follows the coastal routes via Panama or the Cape to Eastern U.S.A., and Europe. Along Western South America the chief ports are Valdivia (40° 0' S 73° 25' W), Valparaíso (33° 12' S 71° 30' W), and Callao (12° 0' S 77° 0' W).

The opening of the Panama Canal has had a considerable influence on shipping routes and trade, for it has provided a great gateway from the Atlantic to the Pacific, and thereby eliminated the necessity for the long and dangerous journey round the south of South America. Among the chief adjustments to the previous routes from Eastern U.S.A. and Europe to the Pacific are the following

(1) To WESTERN SOUTH AMERICA

The eastern seaboard of the U.S.A. is almost due north of the western seaboard of South America, and the Panama provides a very great saving over the Magellan route in time and distance. From Europe, too, the canal effects a valuable saving, but not to the same extent as for the U.S.A.

(2) TO WESTERN NORTH AMERICA

Here again the saving is tremendous, both for the U.S.A. and for Europe, but the advantage to the former is the greater. For example, the distance between San Francisco and New York via the Magellan Straits or Cape Horn route is over 13,000 miles, and that via Panama is merely 5000, a saving of 8000 miles. A similar comparison of the routes from San Francisco to British ports shows that Panama effects a saving of 5000-6000 miles. It is interesting to note that by far the greater proportion of trade between the eastern and western coasts of the U.S.A. utilizes the Panama, an example of imports and exports comprising internal trade.

TO EASTERN ASIA

The Panama has resulted in the considerable shortening of distances between Eastern U.S.A. and North-eastern Asia, especially China and Japan, but for European countries the route by Suez is the shorter, and the opening of Panama has thus given an advantage to the U.S.A., but not to Europe.

TO AUSTRALASIA

Here again the U.S.A. has the resultant advantages of the opening of Panama, for whereas English ports were originally some 1500 miles nearer to Sydney than those of Eastern U.S.A., the steamship distances are now roughly equal—a factor which helps American markets in our colonies.

Routes to New Zealand have been shortened both for U.S.A. and Europe, but whereas the distance for the former has been decreased by some 2500 miles, that for Europe has only been decreased by some 1900 miles. In other words, New Zealand has, by means of Panama, been brought closer both to Europe and to the U.S.A. with the greater advantage to the latter. *For all places to the west of Singapore, the opening of Panama has not shortened distances either for Europe or the U.S.A.*

(N.B. Compared with that in the Atlantic, ocean transport in the Pacific is relatively small. The great ocean

distances between the ports of call, and the scarcity of coaling stations, are contributory causes to this factor)

3 Routes to the East

(a) THE CAPE ROUTE

While considering the Atlantic routes, it was shown that important shipping routes tie up at the Cape of Good Hope,

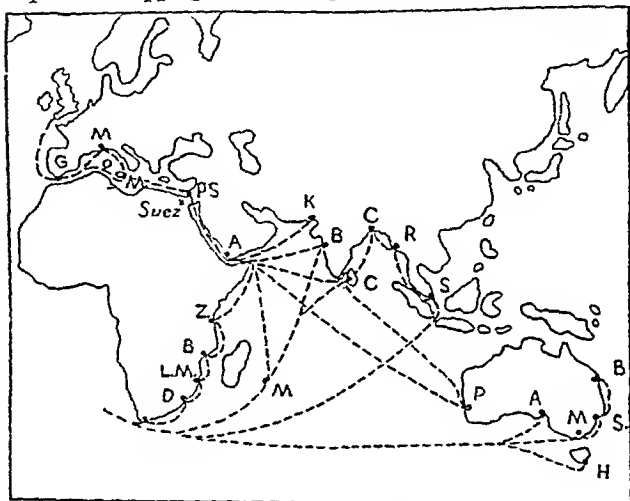


FIG 46 MAIN SEA ROUTES TO THE EAST

Identify each of the main ports, indicated by initials, and note from the text the chief trade of each

which was at one time the easiest method of entry to the Indian Ocean from both Europe and the U S A From the Cape the routes divide again into—

(a) *The East African Route*, serving such ports as Durban (30° S 31° E), Lourenço Marques (26° S 32° 40' E.), Beira (20° S 35° E), and Zanzibar The activity of shipping here is mainly associated with coastal trade, delivering manufactured goods collected in U S A or Europe, and taking on board such raw materials as wool, maize, copra, spices, and cotton

Durban and Lourenço Marques are important coaling ports

(b) *The Indian Route*, mainly to the ports of Bombay and Colombo The British Island of Mauritius (20.10 S. 57 25 E.) is an important port of call, at which sugar and copra are exported, and manufactured goods imported.

(c) *The East Indies Route* via Singapore.

(d) *The South Atlantic Route to Australasia*, which uses mainly the ports of Adelaide (35.0 S. 138 43 E.), Hobart (43.0 S. 147.6 E.), and Wellington Traffic consists mainly of manufactured goods outward bound from Europe and the U.S.A., while in the reverse direction come such produce as wool and meat.

(b) THE SUEZ ROUTE

This short cut to the Indian Ocean represents a considerable saving of distance over the Cape route for both Europe and the U.S.A. From Britain to the west coast of India, for example, the saving is some 4000 miles. These routes to the East serve the Mediterranean lands, India, the Far East, and Australasia, and it is estimated that the shipping through the Suez Canal serves about three-quarters of the world's population.

Traffic, as usual with the main shipping routes, consists largely in the movement of industrial and manufactured goods outward from Europe and the U.S.A.; and the movement of food and raw materials in the opposite direction. The transport of passengers and mails is also very important. Among the chief shipping companies here are the Orient, the Peninsular and Oriental (P & O), and the Nippon Yusen Kaisha

In spite of the decreased steaming distances between the Atlantic and Indian Oceans resulting from the opening of the Suez Canal, some freight and tramp steamers use the route via the Cape of Good Hope, in order to avoid paying the heavy canal dues The bulk of the traffic, however, uses the Suez route, which provides many ports of call and coaling stations, and a great volume and variety of commodities to be moved. In the Mediterranean itself, Gibraltar (36.10 N. 5.20 W.), Malta (35.52 N. 14 26 E.), and

Port Said (31° 28' N. 32° 6' E.) are the chief ports of call and coaling stations on the direct route to the East. The valuable position of Mar-sile- for trade with the East must be noted. At the southern end of the Red Sea is Aden (12° 45' N. 45° 0' E.), an important coaling station. From here the routes divide —

(a) *Along Eastern Africa*, where the route meets that from the Cape, and to Mauritius.

(b) *To Australasia*, where the chief ports are Fremantle (32° 0' S. 116° 0' E.), Adelaide, Melbourne, Sydney, Brisbane, and Wellington. Traffic outward is in the form of manufactured articles, such as textiles, iron and steel, and machinery, while in the reverse direction are transported wheat, wool, mutton, dairy produce, fruit, and gold.

(c) *To India*. Karachi (25° 0' N. 67° 0' E.), Bombay, and Colombo (Ceylon) are all important. Imports are mainly manufactured goods, and exports are wheat (Karachi), raw cotton, oil-seeds, leather and hides (Bombay), and tea and rubber (Colombo).

From Colombo, the route again divides, one branch running to Fremantle (Australia), one to Singapore, and others to Calcutta (22° 35' N. 88° 21' E.) and Rangoon (17° 0' N. 96° 25' E.). Singapore, the great market and entrepôt of the East, ships westwards a variety of commodities such as tea, sugar, spices, tobacco, soya beans, copra, rubber, and tin (the last-mentioned mainly from the Malay Peninsula). From Singapore short routes make contact with the East Indies, and the Pacific seaboard of Asia.

The last of the route divisions from Colombo affect Calcutta and Rangoon. The former exports jute and tea, and the latter rice, raw cotton, teak, and petroleum.

D PANAMA AND SUEZ

The bulk of the traffic through these two canals is directed to or from the great manufacturing centres of the world, viz. U.S.A. and Europe. Roughly speaking, the regions bordering the Indian Ocean are nearer to these manufacturing centres via Suez than via Panama, while the reverse is true of those regions bordering the Pacific.

Distance, however, is not the only factor to be considered. New Zealand and East Australia, for example, are close to U.S.A. and Europe via Panama, but much of their trade proceeds via Suez to Europe, owing to the fact that on this latter route there are many ports of call and the consequent likelihood of intermediate trade. Across the Pacific to Panama, on the other hand, the only port of call is Tahiti (17.39 S. 149.30 W.), and shipping is not greatly attracted by this route. Apart from Australasia, the bulk of the shipping using the Suez is engaged in traffic in the regions surrounding the Indian Ocean, regions which are nearer to their markets by this route than by Panama. It follows then that the opening of Panama has not seriously affected the amount of traffic handled by Suez, although it has proved of immense value to Eastern U.S.A. in her trade with the Pacific seaboard of Asia and North and South America.

E. THE AIRWAYS OF THE WORLD

Civil aviation as a means of transport has made great strides since the Great War, and while it does not compete with road, rail, and ship transport as a conveyer of heavy commodities, its speed attracts mails and passengers, and goods of a perishable or valuable nature.

In the *United States*, civil aviation is highly developed. The main route runs across the continent from San Francisco to New York and Boston (42 18 N. 71 0 W.), while branches from north and south join the main line at Salt Lake City (41.0 N. 112 0 W.), Cheyenne (41 20 N. 105 0 W.), Chicago (41.50 N. 87 50 W.), and Pittsburgh. Many small companies are in operation and, in time, an airways network will undoubtedly develop over most of the U.S.A. and Eastern Canada. In *South America*, commercial air lines operate along the East Coast from Pernambuco (8 5 S. 35 10 W.) in the north to Buenos Aires in the south, serving Rio de Janeiro and Montevideo *en route*.

In the Old World, the leading countries developing civil aviation air lines are France, Holland, Germany, Britain, and Switzerland. France, Holland, and Britain began by developing air lines to link up their colonies as far as possible,

The Eastern Service

This follows the African route to Alexandria, and then proceeds to Baghdad (33 23 N. 44.30 E.), Basra (30 30 N 47.50 E.), and Karachi. India and Pakistan are served by this route (Karachi-Delhi-Calcutta-Rangoon), and Australia is reached via Singapore and Darwin. The terminus of the service is Brisbane, and the time for the London-Brisbane flight is thirteen days, as compared with the record-breaking flight of three days set up by Scott and Black in 1935, and the mail steamer time of thirty-five days.

Atlantic and Pacific Routes

There are now well established routes across both these oceans.

In the case of the Atlantic there are two routes

1. Prestwick (Scotland) direct to St John (Newfoundland)-Halifax (Nova Scotia).
2. London-Lisbon (Portugal)-Azores-Bermuda-New York.

In the Pacific there are three routes of importance.

1. San Francisco - Honolulu - Canton Island - Sydney (Australia).
2. San Francisco-Honolulu-Wake Island-Guam-Philippine Islands-Canton (China)-Singapore-Calcutta.
3. A route up the coast of Canada, across the Aleutian Islands, and south to Japan.

In all countries the growth of air transport since 1939 has been tremendous and most countries are now linked by air routes. These routes are carefully controlled by international agreement

(Note. The student should procure from the Post Office the latest Air Mail Leaflet, and study it carefully.)

EXERCISE 6

(1) Explain what is meant by Great Circle Sailing. Show by means of a sketch map the path taken by a ship following the shortest route from San Francisco to Tokyo. What are the differences between summer routes and winter routes from North American ports to Europe?

(2) On a traced blank map of the world mark the sea routes, and one intermediate port of call in each case, from London to—

- (a) Rio de Janeiro
- (b) Vancouver
- (c) Hong Kong (two routes).
- (d) Auckland (two routes).
- (e) Colombo (two routes)

For (c), (d), and (e) mark the longer route in each case by *L*. Beside each port indicated on your map, print the name of one commodity exported

(3) Discuss fully the effect of the Panama and Suez Canals on world shipping routes

(4) Draw a sketch map to illustrate the air route to Capetown. Mark and name the British dominions served, together with six points of call

CHAPTER VII

ASIA

N.B. Important British possessions in Asia are: the Federated Malay States, Northern Borneo, Hong Kong, and Aden.

A. Position

THIS, the largest of the continents, extends from 10° S. of the Equator well into the Arctic Circle, and in the east-west direction between the longitude limits of 25° E and 170° E.

Atlas study of the most important lines of latitude will help to define the position of much of the continent. The Equator runs through Sumatra, Borneo, and the Celebes, while the Tropic of Cancer runs across Arabia, India, Burma, and South China. At the other extreme a considerable portion of Northern Siberia lies within the Arctic Circle.

B. Physical Features

The physical structure of Asia may conveniently be considered under three headings: the Northern Lowlands, the Central Highland systems, and the plateaux and river valleys of the south and south-east

1 THE NORTHERN LOWLANDS

These lowlands comprise much of Northern Siberia, together with that part of Siberia to the east of the Caspian Sea. The land is generally poorly drained, for the northward flowing rivers, of which the Obi and Yenesei are the chief, are frozen throughout their lower courses in winter, and the influx of water from the headstreams causes flooding.

2. THE CENTRAL HIGHLAND SYSTEMS

Here the main mountain chains maintain roughly an east-west direction, and enclose great plateaux or regions of inland drainage. Proceeding from west to east, the main chains are the Caucasus (which lie in Europe, but form part of this mountain system), Hindu Kush, Tien Shan, Altai

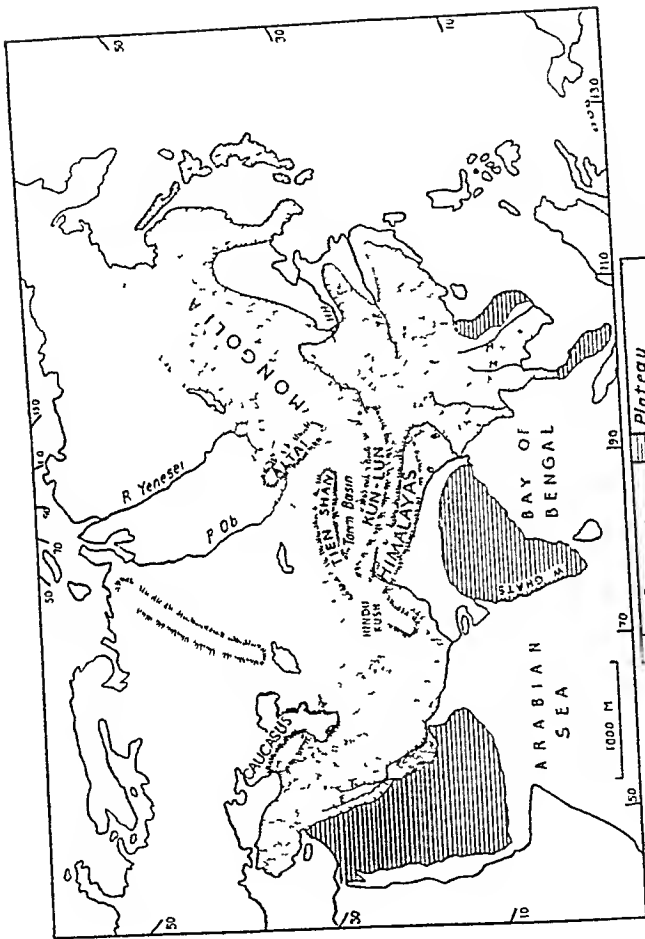


FIG 48 OURSTANDING PHYSICAL FEATURES OF ASIA
 Identify each of the main rivers, which are indicated by initials.

Mountains, Kunlun, and the Himalayas. Associated with these mountain chains are the Tarim Basin, which is an area of inland drainage, and the great plateaux of Turkey, Persia, Tibet, and Mongolia, which includes the Gobi Desert.

With this central system are also associated the mountain chains which comprise much of Afghanistan, Burma, China, Japan, and the other islands off the coasts.

3. THE PLATEAUX AND RIVER VALLEYS OF THE SOUTH AND SOUTH-EAST

The great plateaux comprise Arabia, Peninsular India, South-west China, Malaya, and French Indo-China. In India, the plateau has a fairly gradual slope from West to East, but is tilted and presents a steep wall to the Arabian Sea and a more gradual approach from the Bay of Bengal. The steep wall in the west, and the more gradual rise in the east, form the Western and Eastern Ghats respectively.

The great river basins occupy large lowland areas between the central mountain chains and the plateaux.

The position of the rivers Tigris, Euphrates, Indus, Ganges, Irrawaddy, Menam, Mekong, Yangtze Kiang, and Hwang Ho should be carefully noted in this connexion.

C. Climate

In reading this section, bear in mind all that was said under the heading of Monsoon Climates (Chapter III).

The great extent of the continent, together with its physical features, affects the climatic conditions considerably. Extreme continental conditions in Central Asia result from the great extent of the land mass, and the presence of the great mountain systems which act as an effective barrier to the modifying influence of the sea.

1. THE WINTER SEASON. (Refer to Figs 12 and 49)

During January, when the sun is overhead in the Southern Hemisphere, the isotherm for 60° F. runs across Northern India and Southern China, while inland the temperature gradient is steep and much of Northern Asia is below freezing point. The southward bend of the winter isotherm

is characteristic of continental climates, and shows that, latitude for latitude, the coasts are much warmer than the interior. This is accentuated off the east coast, where the warm Kuro Siwo current exercises an additional moderating influence on the winter temperatures of Japan. The

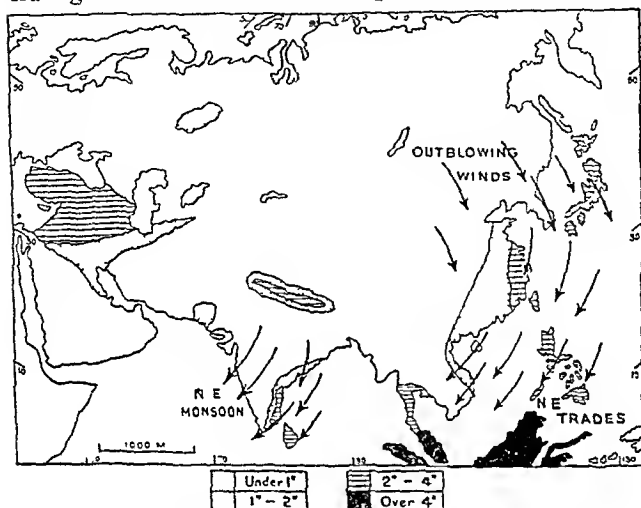


FIG 49 JANUARY RAINFALL AND WINDS OF ASIA

Himalayas shelter India from the cold out-blowing Siberian winds

During the winter season, the cold conditions cause outblowing winds which are mainly dry. Exceptions to this are found in Japan, the coast of Eastern China, Southern India, and Ceylon, where they have crossed stretches of sea, as a result of which they become rain-bearing.

Malaya and the Dutch East Indies, lying as they do in equatorial regions, experience rain all the year round.

2 THE SUMMER SEASON (Refer to Figs 11 and 50)

During the summer season, the sun is overhead in the Northern Hemisphere, and causes great heating of the land

mass, especially of Arabia, India, and Southern China, all of which lie along the Tropic of Cancer. In the interior of the continent, too, this influence is felt, and the July isotherm of 60° F. runs almost into the Arctic Circle. The sudden southward bend of this latter isotherm off the east

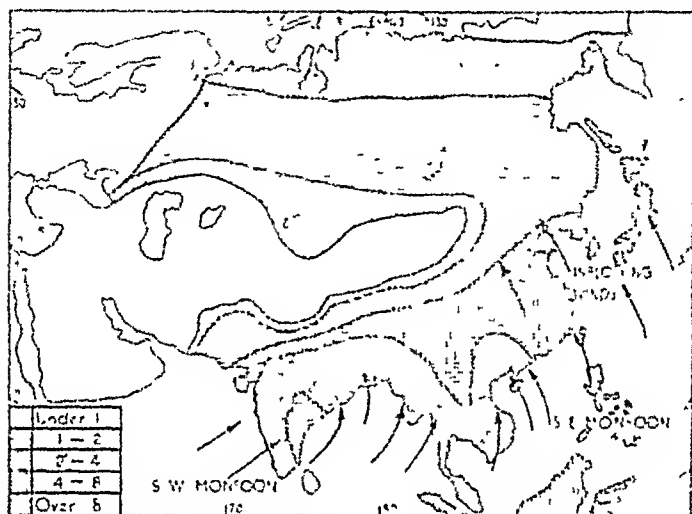


FIG. 50. JULY RAINFALL AND WINDS OF ASIA

coast is due partly to the moderating influence of the sea and the cold Kamchatka current.

The heating of the land mass causes inblowing winds and rainfall results. This is most clearly marked in the case of the monsoon countries, but is also characteristic of much of Central Asia. In Fig. 50 the effect of the mountain barrier on inblowing rain-bearing winds is clearly marked

D. Natural Regions

In Asia the natural regions are as indicated in Fig. 51, and serve to show the immense extent of the continent. Reference should be made to Chapter III for the characteristics of the main natural regions, in addition to which the following should be carefully studied.

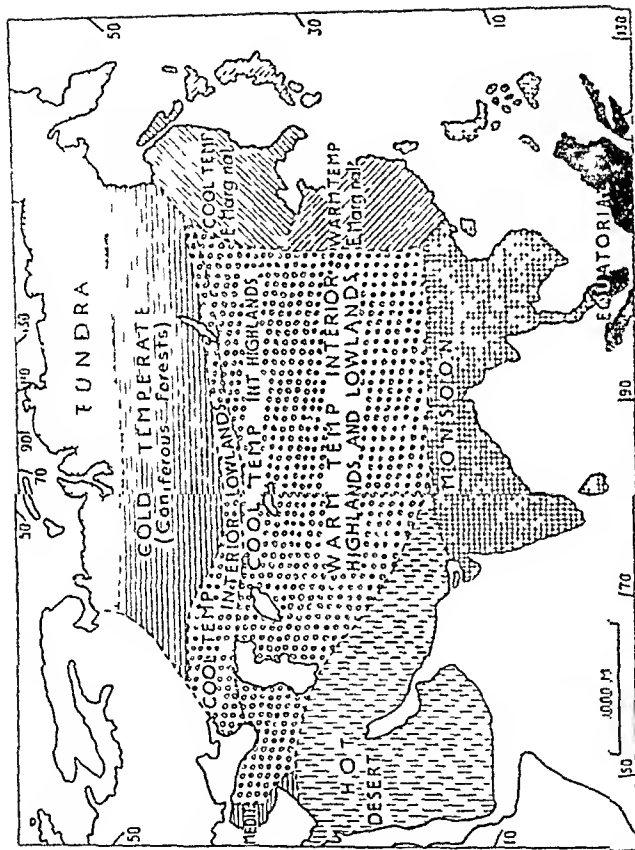


FIG. 51. NATURAL REGIONS OF ASIA.

The Tundra region in the north is almost uninhabited, and the coniferous forest belt supports but a scanty population engaged in trapping fur-bearing animals. Exploitation of the softwood timbers is difficult owing to the swampy nature of the soil and the lack of communications. In this connexion the rivers are useless, for they open into the unnavigable Arctic Ocean.

The southern margins of the forests, together with the steppelands, are being developed by the U S S R, and the south-western region, in particular, is producing considerable quantities of cereals and dairy produce. Irrigation on a large scale is practised in the drier region towards the desert margin, and cotton fields are developing.

The desert regions are inhabited by nomadic tribes, of which the Klurgiz horsemen (who keep herds of sheep, cattle, goats, and camels) are characteristic. In the oases, and in the regions irrigated from the rivers, cotton, cereals, and fruits are produced. The Euphrates-Tigris valley, situated amid great deserts, produces wheat, cotton, and fruits by the help of irrigation. Baghdad and Basra are the chief towns in this region.

The monsoon, warm and cool temperate climatic regions (East Marginals) will be considered later in this chapter, when the countries experiencing these climatic types are considered in more detail.

The equatorial climate experienced in Southern Malaya, Sumatra, Java, Borneo, the Celebes (20 S 120 30 E), Moluccas (10 S 127 0 E), and the Philippines (13 0 N 123 0 E.) produces forest growth, which has, however, been cleared over wide areas, and many valuable crops are produced. Rice and sugar are produced in all the areas, and the latter commodity is exported to temperate lands.

Other important crops are spices, mainly from the Moluccas; tobacco from Borneo and Sumatra; rubber from Malaya, Sumatra, and Java; coco-nuts and manila and hemp from the Philippines; and tea from Java. This last-named island is very productive, and has a considerable export trade which is handled mainly by Batavia and Surabaya.

E. Mineral Wealth

Asia is rich in minerals, but, apart from rare metals, such as gold and silver, little was done until recent years to exploit this wealth. Even now the general lack of good rail and road communication retards development, and there are enormous resources practically untouched.

1 PRECIOUS METALS

India is famous for the production of gold, and the Kolar region in Mysore (13° 30' N 77° 0' E) is the chief area of production. Gold is also found in considerable quantities in the mountains of Eastern Siberia, especially in the Lena Valley (66° 30' N 123° 30' E), in China, and in the Philippines.

Other precious metals and stones, such as gems, sapphires, and rubies are found in Ceylon and North-eastern Burma, while large quantities of silver are found in Burma and the Altai mountain region of Siberia. This last-mentioned resource has not yet been exploited to any considerable extent.

2 COAL RESOURCES

In this commodity resources are great but, as yet, scarcely touched. The main deposits lie in the interior of the regions, and exploitation of this bulky commodity has had to await the development of railways.

Siberia possesses vast untouched resources, especially round Tomsk (56° 30' N 84° 25' E) and Irkutsk (53° 30' N 104° 0' E), while in the Chinese provinces of Shansi, Shensi, Czechwan, and Shantung, the resources are estimated to be as great as those of the U.S.A., which is, at present, the leading producer in the world, with an annual output of 550,000,000 tons. The annual production in China is about 10,000,000 tons only.

In India, too, the coal reserves are being developed, and there is an annual production of about 20,000,000 tons, chiefly from the plateau region to the west and north-west of Calcutta.

Japan has coal mines, but cannot produce sufficient for her home requirements and has to supplement her output by means of imports. Japan is thus much interested in

the coal resources of the mainland, especially those of Manchukuo (the old province of Manchuria). The development of railway transport in Manchukuo has led to considerably increased development of its coal resources

Other regions in Asia which produce coal are the Philippines, whose coal is used to a great extent for shipping, the Mekong valley of French Indo-China, Malaya, and Turkey.

3 PETROLEUM

The petroleum reserves of Asia are being exploited to a considerable extent. Persia (or Iran) ranks high among world producers, and the reserves of Iraq are also being fully exploited. Nearly all the oil is pumped through pipelines to the coast for refining and export. In Asiatic Russia important fields occur along the western shores of the Caspian. Baku, situated in Europe, is an important town associated with this field. Burma is another important producer, and here the oil is pumped from the upper Irrawaddy valley to Rangoon. In India, especially in Assam and the Punjab (31° 45' N. 74° 30' E.), are found smaller reserves, while in the East Indies, Borneo and Java rank as producers and exporters. Surabaya (Java) is important in connexion with this trade.

4 IRON ORE

This, like coal, exists in large quantities in Asia, but has been little exploited. Korea (38° 30' N. 127° 0' E.) and China both possess rich deposits, whereas Japan has only small reserves and must import considerable quantities. Owing to Japan's encouragement the mining of ore has developed considerably in Korea. In China the chief deposits are found in Shantung, Shansi, and the Yangtze Kiang valley, where, at Hankow (30° 0' N. 118° 25' E.), large iron and steel works have developed. Elsewhere in Asia deposits of iron ore are scattered in much smaller quantities.

5. OTHER MINERALS

Tin occurs in considerable quantities in South-west China, and is at present merely another of China's unexploited resources. In the Malayan Peninsula, however, the tin

resources are exploited, and Malaya produces about 35 per cent of the world's supply. The product is sent to Penang and Singapore for refining and export to areas such as South Wales, where it is used in tin-plating. The Dutch East Indian Islands of Banka (2° 30' S. 106° 0' E.) and Belitong also produce and export considerable quantities. Graphite is produced in Ceylon, and China possesses great reserves of copper.

F Communications

Over much of Asia to-day transport depends on the utilization of pack animals, human porters, and rivers (see Chapter V). Throughout the centuries caravan routes have linked Asia and Japan with the Mediterranean countries of Asia, and even to-day they are still used, for vast areas are still inaccessible by railway. In South-western Asia there is, however, railway communication between Smyrna in Turkey (38° 22' N. 27° 0' E.), Aleppo in Syria (36° 25' N. 37° 0' E.), Damascus in Syria (33° 30' N. 36° 18' E.), and Medina in Arabia (24° 20' N. 10° 0' E.). From Aleppo communication is made with Baghdad and Basra (Iraq). From the eastern side of the Caspian a railway line runs north-eastwards and joins the *Trans-Siberian Railway* near Tomsk. The *Trans-Siberian Railway* is the one great railway serving Siberia and helps to link it to Russia. Starting at Vladivostok (43° 0' N. 131° 50' E.), the line runs to Harbin in Manchukuo, where it is met by a line from Peiping (Peking) and Moukden. From Harbin the line runs through mountainous country to Irkutsk (52° 30' N. 104° 0' E.), to the south of Lake Baikal, and then on to Tomsk, where it is met by a branch of the *Central Asiatic Railway*. At Omsk (55° 0' N. 73° 10' E.) the line divides, and one loop runs to the south, serving Central Russia and Moscow, while the other serves Perm (58° 0' N. 56° 20' E.) and Leningrad (60° 0' N. 30° 25' E.). It is interesting, and instructive, to note that over much of the route wood is used in the engines as a fuel, a factor which points to the availability of timber (coniferous woodlands), and the inaccessibility of coal. The value of the *Trans-Siberian Railway* for rapid conveyance of mails and passengers is stressed by a comparison of the times taken from London

to Japan by this route and by sea. In normal times, London is within eighteen days of Japan by using the Trans-Siberian Railway, whereas the sea journey takes six weeks.

India is well served with railways. The main lines connect up the important ports of Karachi, Bombay, Madras (13.0 N. 80 22 E), and Calcutta, and in so doing serve the inland cities of Lahore (31.30 N 74 23 E), Delhi (28.42 N.

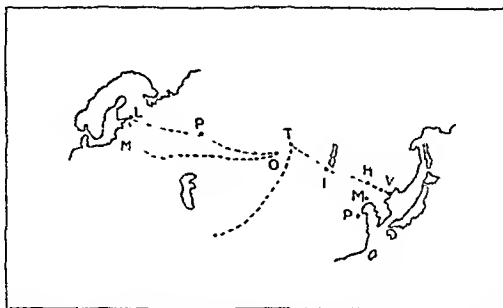


FIG. 52 ROUTE TAKEN BY TRANS-SIBERIAN RAILWAY
Identify each of the towns indicated by initials

77 20 E), Jubbulpore (23.0 N. 79 40 E), Nagpur (21 0 N 79.0 E), and Hyderabad (17 25 N. 78 35 E.). Associated with these main lines are many branch lines which help to complete a veritable network. In India the Ganges and Brahmaputra are important agents of transport, and river steamers can proceed as far as Allahabad (25 25 N 81 50 E)

In China, railways have not been developed to the same extent as in India, and this country still depends to a great extent on its rivers—the Si Kiang, Yangtze Kiang, and Hwang Ho. Ocean steamers can proceed up the Yangtze to Hankow, and river steamers to a distance of 1000 miles from the sea.

The main Chinese railway runs from Peiping in the north to Hankow and Canton (23.15 N. 113 30 E) in the south, and from this line connexions are made to important eastern ports such as Shanghai.

Japan, like India, is well supplied with railways, and this

country has encouraged railway development in Korea and Manchukuo. Important lines in these last-named countries run from Fusan ($35^{\circ}12'N$ $129^{\circ}0'E$) and Port Arthur ($39^{\circ}0'N$ $121^{\circ}40'E$) to Moukden ($41^{\circ}50'N$ $124^{\circ}0'E$) and

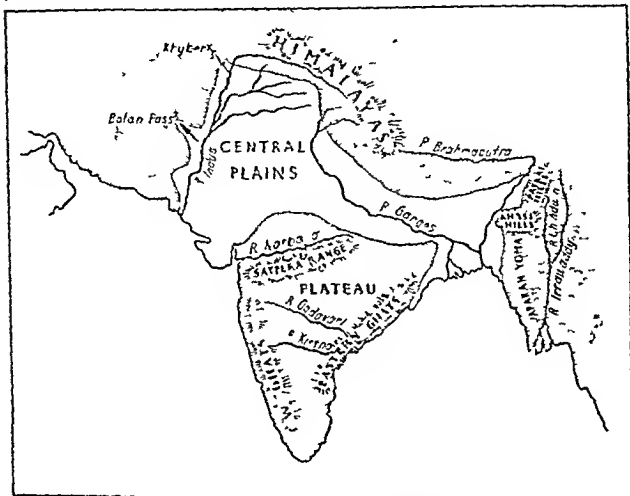


FIG. 53. MAIN PHYSICAL FEATURES OF INDIA

Harbin ($45^{\circ}52'N$ $127^{\circ}50'E$). In Burma and South-east Asia the Irrawaddy and Mekong are valuable as waterways, while railway lines run from Rangoon to Mandalay ($22^{\circ}0'N$ $96^{\circ}12'E$), and from Singapore to Bangkok ($14^{\circ}0'N$ $100^{\circ}30'E$).

INDIA AND BURMA

This section covers India, Pakistan, Ceylon and Burma. India and Pakistan will be referred to conjointly as India throughout the text.

A. Physical Features

1. THE NORTHERN MOUNTAINS

Towards the north, India is ringed in by the Himalayan mountain system, towards the north-west by the mountains

of Afghanistan and Baluchistan, and on the north-east by those of Assam and Burma, such as the Patkai Hills, Khasi Hills, and Arakan Yoma. Included in the Himalayan chain are the highest mountains in the world, notably Mount Everest (28° 3' N 87° 7' E).

The fact that India is hemmed in by mountains to the north gives great importance to the passes by which landward communication can be made with the rest of Asia. The most important are those in the north-west, such as the Bolan Pass, guarded by the town of Quetta (30° 12' N 67.30° E), the Khyber Pass, on which stands Peshawar (34° 3' N 71.30° E), and the route along the coast of Baluchistan. It was through these passes that fierce nomadic warriors descended on the plainland settlers of India, and even to-day warlike activities on the part of the hill tribes require careful watch in order that these passes may be safeguarded from brigandage.

Through the Himalayas towards Tibet there are also passes, but these are little used, and towards Burma there is no land route of note. The normal means of communication between Burma and India is, like that between the rest of the world and India, mainly by sea. On the whole, the mountains are a negative region, for they contribute little to the wealth of India or to the support of her population—with the exception of the great rivers. The Indus, Ganges, and Brahmaputra all rise here, and, being fed from the snows of the mountains, are perennial in nature.

2. THE CENTRAL PLAINS

On leaving the mountains, the Indus, Ganges, and Brahmaputra flow through an immense region of level fertile plainland. The exact course of these rivers, together with the extent of the plainland, should be carefully noted on the atlas and on Fig. 53.

3. THE PLATEAU

Peninsular India consists largely of a plateau, bounded by the Western Ghats and Eastern Ghats. Towards the north lies the Satpura line of mountains. On the plateau

B. Rainfall and Agriculture

India exhibits the characteristics of the monsoon type of climate

A map of the rainfall conditions of India (see Fig. 54) shows the influence of the build of the country on precipitation. Inland the amount decreases, and it is also noticeable that the Western Ghats ensure a very heavy rainfall

On this distribution of rainfall depend to a great extent the agricultural activities of India. Like all monsoon countries, India supports an immense population, in this case over 389,000,000 (cf. England 38,000,000), chiefly on her own agricultural produce. Compared with the amounts grown annually, the export of foodstuffs is very small indeed, and in some years India imports rice from Burma to supplement her own huge production

RICE

Rice is the staple food where the rainfall is over 50 inches, and is therefore very important in the Lower Ganges-Brahmaputra valleys and along the west coast. Many crops are grown on the same patch of land in a year, and where the rainfall is insufficient for this purpose, irrigation is practised. In the main rice-producing regions this intensive agriculture supports a population density of over 500 per square mile.

WHEAT

In Northern India where the rainfall ranges from 10-50 inches annually, wheat is of great importance, and this crop is of especial value in that it is grown mainly during the cool season, and thus allows crops such as millet and maize to be grown on the same patch of ground during the remainder of the year. Wheat is also very largely grown under irrigation in areas where the rainfall falls below 20 inches, and in this connexion the great rivers of the plainland are of importance. The fact that they supply a constant flow of water enables large irrigation projects to be established. Large areas in the Indus and Upper Ganges are now irrigated; as a result, the Punjab joins the United Provinces

and the Northern Plateau region as a great wheat-producer. Some of this wheat is exported from the port of Karachi.

This export goes primarily to Great Britain. Pakistan is also exporting wheat to the new Dominion of India.

MILLET, OLSEEDS, COTTON

While it is grown in the same area as wheat, millet is chiefly concentrated on the plateau region of South India (Rainfall below 50 inches). Other crops which are also grown on the plateau in great quantities are oilseeds, such as linseed, rape and ground-nuts, cotton and rice. Irrigation is practised from wells and from the rivers, but since these depend entirely on the monsoon rains, irrigation projects are not reliable, and any failure of the monsoon results also in a failure of irrigation waters. As a result of this, Peninsular India has, in the past, suffered terrible famines, but the advance of railway communications helps to make possible rapid transference of food to a distressed area, and so, although the loss of crops and stock is a hard blow to the farmer, the resulting hardship to the farmer is not quite so acute as it used to be.

Cotton is grown mainly within a triangle formed by Bombay, Jubbulpore, and Hyderabad, where, on the *Deccan*, as it is called, the soil is very fertile and particularly suitable. Bombay is the chief port engaged in export of raw cotton. Some cotton is also grown under irrigation in the Indo-Gangetic plain, and exported from Karachi.

SUGAR CANE

This is grown throughout India, but is especially important in the Central (Indo-Gangetic) plains, chiefly on the irrigated tracts. In spite of being the largest sugar producing country in the world, much is still imported.

TEA

This is one of the very few Indian crops produced for export, and is grown chiefly in the hilly regions. Assam, the Darjeeling region (27° 8' N. 88° 18' E.) of the Himalayas, the Nilgiri Hills (11° 45' N. 76° 40' E.) of South India, and Ceylon are the chief producing areas.

C. The Indian Peasant

More than 70 per cent of the huge population are peasants, and large-scale farming scarcely exists. The average size of the farms varies from 5-10 acres, and these are, of necessity, intensely cultivated. The peasant, generally, is happy if he can produce sufficient to maintain himself and his family; in other words, existence is on a bare subsistence level. Again, most of the Indian peasants have had to borrow money to pay for equipment and stock, and since a high rate of interest is charged by the professional money-lenders, the peasants remain in debt all their lives—and hand on their debts to their descendants.

The typical Indian settlement is the village of mud huts, often situated many miles from good roads, railways, or other means of communication. Here the peasant is born, lives, and dies, seldom moving more than a few miles from his native village. This lack of migration, together with a high birth rate, causes many areas to be over-populated and, in the areas not irrigated from perennial rivers, there is always danger of loss of crops resulting from the failure of the monsoon.

These difficulties of the Indian agriculturist, together with his hostility towards any kind of change, form one of the main obstacles to progress in India.

D. Manufactures

For centuries India has been famed for her skilled workmanship in the production of articles made of silks, valuable metals, and wood; but these industries were mainly carried on in the homes of the people—a method of manufacture classed under the term “domestic system.” The factory system is a comparatively recent innovation in India; but although India is still predominantly agricultural, there are many large-scale industrial activities of note.

1. THE PREPARATION OF AGRICULTURAL PRODUCE FOR MARKET

Sugar has to undergo industrial processes before sale, and since the growth of the cane is widely scattered so, too, the mills are distributed over a considerable area. Wheat and flour mills are concentrated chiefly in the Indus and .

Upper Ganges valleys. Karachi and Delhi are two important centres actively engaged in this type of manufacture. Tea, as previously mentioned, is grown mainly for export, and the tea-drying and packing industry is important in all the main areas of production.

2. JUTE MANUFACTURE

Much of the jute produced is exported, but a considerable amount is also used in the mills of Calcutta for the manufacture of coarse fabrics, such as sacking.

3. COTTON MANUFACTURE

In the large cities on or near the Deccan region, cotton mills have been established to use some of the raw material grown locally. The most important of these towns are Bombay, Jubbulpore, Hyderabad, and Nagpur.

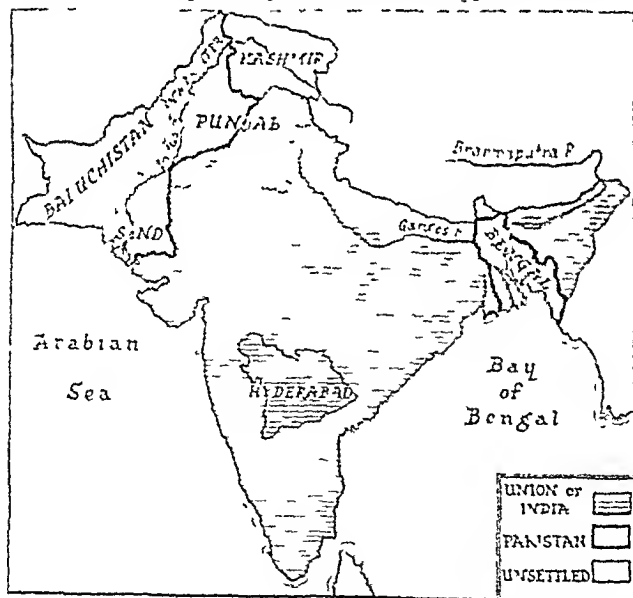


FIG 53 DIVISION OF PAKISTAN AND INDIA

4 IRON AND STEEL

This industry is not developed on a large scale, but there is an important modern works on the Chota-Nagpur coal-field in the north-eastern part of the plateau

E Trade and Ports

Owing to the fact that India is closed towards the north by a wall of mountains, nearly all the trade of India is by the sea routes. Since India is mainly agricultural, the exports are chiefly raw materials and agricultural products. Raw cotton is exported from Bombay and Karachi, jute from Calcutta, tea from Calcutta and Colombo, hides and leather from Madras, and oilseeds from most of the ports of Peninsular India. Burma exports rice, petroleum, and teak. Rangoon is the one great port dealing with this trade.

Manufactured goods also enter the export market. The chief exports of this type are jute sackings from Calcutta and low quality cotton articles from Bombay and Madras. The imports are mainly manufactured goods, foods in which India is deficient, and gold and silver. The import of treasure is interesting in view of the large home production, but this apparent anomaly is explained by the fact that the peasants hoard any wealth they possess in the form of ornaments made from gold and silver.

The chief manufactured articles imported are cotton goods of higher quality than those produced at home, iron and steel, and machinery. Of the imported foodstuffs, sugar is the most important. Since India possesses a surplus of raw materials, and needs manufactured articles, it follows that her chief trade lies with highly industrialized countries, such as Great Britain, the United States of America, France, Germany, and Japan. At one time, for example, India was a very important market for Lancashire's cotton manufactures, but this particular trade has now largely decreased partly owing to the development of cotton manufactures in India, and partly to increased Japanese output and competition.

The Partition

In August 1947 the partition of India took effect. There now exist two Dominions, India and Pakistan.

The division was based primarily on religion, the Mohammedans in Pakistan and Hindus in India. This meant splitting two states.

(a) Punjab. The frontier runs approximately N.E. - S.W. between the towns of Lahore (Pakistan) and Amritsar (India).

(b) Bengal. Here the frontier runs almost N.-S. from 12 miles E. of Darjeeling southwards to 50 miles E. of Calcutta.

There are two states whose position, at the time of writing, is still undecided. They are Kashmir in the north and Hyderabad in the central Deccan.

From studying the map (Fig. 55) and the foregoing text it will be seen that India has—

- (a) The majority of the minerals
- (b) The best farming land
- (c) The three main ports of Calcutta, Bombay and Madras
- (d) Easier communications

Pakistan, on the other hand, is not entirely without economic prospects. The following points are worth consideration—

A West Pakistan

Population 35 million, (India) 300 million, Wheat 36-8 per cent of total output of the two Dominions. The surplus finds a ready market in India and Great Britain. There is also a surplus of good quality cotton for export.

Farming is profitable but relies almost entirely on the Sukkur irrigation scheme. Industrially not very well developed. Textiles and sports goods are manufactured at Karachi which is also the main port of Pakistan. As an airport Karachi is of growing importance.

B East Pakistan

Population 40 million, Jute 75 per cent of world production, tea £20 million surplus in 1947.

There is some good farming land watered by the Brahmaputra River.

Unfortunately the region has only one small port—Chittagong. India has recently agreed, however, to let East Pakistan use Calcutta as a port

SIAM AND FRENCH INDO-CHINA

These two countries, although they experience the monsoon type of climate, are not densely populated. The mountainous regions are forested, while in the lowlands drained by the Menam and Mekong agriculture is carried on. The chief crop grown is rice, and since the home demand is not great, much is exported. Teak, which is floated down the rivers from the mountains, forms another important export. As in the case of India, manufactured goods are the chief imports. The chief ports are Bangkok, from which runs an important railway to Singapore, and Saigon (10 40 N. 106 30 E).

CHINA

The Chinese Empire at one time contained China proper, together with Korea, Manchuria, Mongolia, Sinkiang, and Tibet, but many of the outer provinces now have but scanty regard for the central government of Peiping (Peking) and Nanking, and are virtually independent. In addition, by 1939, Korea had become a province of Japan, and the old country of Manchuria had become Manchukuo, a new kingdom virtually under the dominance of Japan.

China proper lies farther north than India, note the position of latitude 40° N and the Tropic of Cancer

A. Physical Features

On the west, China proper is bounded by the plateaux of Mongolia, Tibet, and Yunnan, from which run the mountain systems which cover much of the country. Running eastwards are the three great rivers of China. the Hwang Ho, which opens out into an extensive plain in its lower course, the Yangtze Kiang, and the Si Kiang. The Hwang Ho is often designated "China's Sorrow," for its lower course is across level low-lying land which is flooded

when the river breaks its banks. Embankments have been built in the attempt to keep the river within the confines of its banks, but the danger of flooding still exists. Towards the north-west the river flows through a region of fertile soil, brought by winds from Central Asia. Thus, the "Loess" region as it is called, produces good crops where irrigation is possible.

B Climate

In the south, China lies within monsoon latitudes, and the Si Kiang valley experiences monsoon climatic conditions, but farther north, the cold outblowing winds in winter from Central Asia cause low temperatures. Thus, while the rainfall, like that of the monsoon regions, falls in summer, Central and Northern China cannot be classed as monsoon. This exposure to the wintry conditions of Central Asia is due to the absence of a great mountain barrier such as is found in the case of India, where the Himalayas act as an effective protection. During the warm season, when the winds are largely onshore, there is little difference in temperature between North and South China. Central China and North China are examples of the East Marginal subdivisions of the warm temperate and cool temperate climatic division respectively (see Chapter III).

C Agriculture

China, like India, supports an immense population on the agricultural produce of her soil, and since the arable land of the river valleys is somewhat limited, intensive cultivation is carried on. In fact, the Chinese peasant is more of a gardener than a farmer, so great is the labour that he puts into every acre of soil. While various crops are associated with special areas (see later), it should also be borne in mind that on each small farm are kept pigs and poultry, while rotation of crops is also practised. Human and animal refuse are used for fertilizers; and the mixing of soils, often by hand, is an art thoroughly understood by the Chinese. As a result of this intensive type of agriculture, the fertile tracts in the river valleys are very densely populated, for intensive agriculture demands a large reserve

of labour, and in return can support many people to the square mile. A human characteristic of the Chinaman which tends towards a great density of population is his refusal to leave for any length of time the area where he was born. It is the ambition of practically every Chinaman that has migrated to return to his homeland before he dies.

The chief crop productions of China are—

RICE

This is grown where the monsoon type of climate is in evidence, and forms the staple foodstuffs of most of Southern China. The Si Kiang valley is the most important area of rice cultivation, while, in the Yangtze Kiang valley, although the crop is of importance, wheat is also produced.

TEA

Tea, produced mainly for export, is grown in the hill regions of South-east China.

WHEAT AND MILLET

These crops are grown mainly to the north of the Yangtze Kiang valley, and reach their greatest importance in the lowlands of the Hwang Ho. Here these foods form the staple diet of the people.

THE SOYA BEAN

This is a crop of growing importance in North China, and serves as a valuable food-supplement to the other cereal crops.

OTHER CROPS

Sugar is grown in the monsoon regions of the south, but considerable quantities have to be imported to supplement the home production. In the Yangtze valley cotton is extensively grown, and the raw material is sent to the mills of Shanghai or Japan. In the Yangtze valley, too, the mulberry tree flourishes, and large quantities of raw silk are produced.

In the north, maize is grown, but this crop is subsidiary to the other cereals produced, such as wheat and millet

D. Manufactures

Domestic industry, chiefly associated with the spinning and weaving of fabrics, is very old and very widely established. During the present century, however, factories have been firmly established in many of the larger towns and ports. Flour mills have been established in Tientsin (39° 0' N 117° 0' E) and Shanghai, while the manufacture of cotton and silk articles is carried on in Shanghai, Hankow, and in Tsingtao (36° 0' N 120° 25' E).

The vast mineral wealth of China is scarcely used, but there is an important iron and steel works at Hankow

E Trade and Ports

Until the present century, China took very little part in international trade. With the opening up of the country, and the increased interest of large manufacturing countries in the raw materials and natural resources of China, trade has greatly increased, although it has still a long way to go before it reaches that of India. The chief exports are raw silk and cotton, beans and bean products, tea and eggs, while the imports are mainly manufactured goods such as textile products, iron and steel goods, machinery and foodstuffs, e.g. rice and sugar, in which China is deficient. This trade, which is mainly seaborne, is handled by the ports of Tientsin, Shanghai, and Canton. Much of the foreign trade is with highly industrialized countries such as Japan, U.S.A., and Europe.

F British Footholds

Wei-hai-Wei (37° 40' N 122° 15' E), on the Shantung Peninsula, is a British naval base, and in the south, just off the coast, lies Hong Kong, a small island under British rule. The harbour is well protected, and there are no custom duties, as a result of which a considerable portion of the trade of South China passes through this port.

MANCHUKUO

This country consists of a vast central plain, well suited to agriculture, and mountain systems to the east and west. It is from the margins of these mountains that the coal, iron ore, lead, and copper of Manchukuo are produced.

The climate, which is an example of the Eastern Marginal (cool temperate), is extreme, and the temperature ranges from 15° F. in January to 75° F. in July. The rainfall, most of which occurs in summer, is from 15 inches to 25 inches annually.

The combination of plainland, high summer temperatures, and sufficient rainfall makes much of Manchukuo very suitable for the production of cereals such as wheat and millet. The soya bean is even more important and immense quantities are produced. Other productions of increasing importance are maize, cotton, and tobacco.

The land is still scantily populated and was originally poorly served with railways. This latter disadvantage was, prior to 1945, being remedied with the help of Japanese money, and emigrants, mainly Chinese and Japanese, were slowly moving into the country and helping to develop its resources more fully. Japan, a densely populated and progressive nation, needs raw materials, food-stuffs, and a market for her manufactured produce, and Manchukuo, which was virtually a puppet state of Japan, would have helped to meet Japan's requirements.

Most of the trade of Manchukuo was with Japan, and passed through Port Arthur and Dairen (39 0 N. 121 40 E.), both of which were Japanese possessions. The principal exports are agricultural products and raw materials, such as soya beans, bean cake, wheat, millet, coal, iron and timber, while in the opposite direction move manufactured textiles and machinery. Since the defeat of Japan the trade and economic organization of this region have come under the control of the Western Powers and Russia.

On the east and north of Manchukuo lies territory belonging to the U.S.S.R., and a state of tension exists on this frontier where the interests of Moscow and Tokyo clash.

JAPAN

A. Physical Features

Japan proper, lying between latitudes 30° N. and 45° N., consists mainly of four islands—Hokkaido, Honshu, Shikoku, and Kyushu. Included in her Empire, prior to 1945, were Taiwan (or Formosa), Southern Sakhalin, and Korea. For convenience these areas will continue to be treated with Japan. In Japan, most of the land is mountainous, but there are considerable tracts of fertile lowland near the coast and in some of the river valleys. There are many volcanoes in

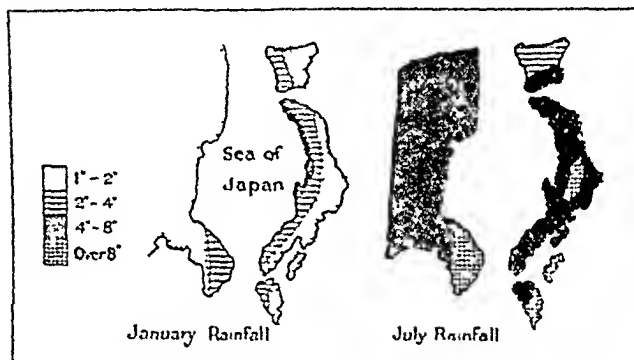


FIG. 56. RAINFALL CONDITIONS IN JAPAN

the mountain chain, and one which is especially worthy of note is Fujiyama ($35^{\circ} 30' \text{ N } 139^{\circ} 0' \text{ E}$), the sacred mountain. The altitude of many of the mountains is responsible for the fact that they are snow-capped throughout the year.

The rivers are short and swift-flowing, and consequently useless for navigation. They are, however, of great value as a source of power, a factor of considerable significance to Japan, which is poor in other power resources.

B Climate

The huge latitudinal extent of the Japanese Empire causes climatic conditions to vary from the monsoon type in Formosa to cold temperate in Northern Hokkaido.

Throughout Japan proper the climate is extreme in nature, and rainfall, which occurs largely in summer, ranges from 60-80 inches on the coastlands, to less than 40 inches in the interior. The western coast, bathed by the cold Korean current, is colder than that of the east, which is affected by the warm Kuro Siwo. A further difference between the west and east coasts is that the west coast receives a considerable amount of winter rainfall, due to the fact that the winter winds, outblowing from Asia, pick up moisture in crossing the sea of Japan.

C. Agriculture and Fishing

The mountainous nature of most of the interior of Japan causes agricultural activity to be concentrated in the coastal plains. The population is large (over 70,000,000), and as a result the limited amount of arable land is intensively cultivated. Rice is the principal crop grown in Southern Japan and Formosa, while towards the north, wheat and barley are of more importance. The cultivation of mulberry and the silkworm is important, while on the hill slopes tea and tobacco are produced. Tea ranks high in the list of exports.

The neighbouring seas are rich in fish, and the fishing industry itself employs nearly 2,000,000 people. The chief fish caught are herrings, mackerel, and sardines—products which, together with rice, form the staple foodstuffs of the bulk of the people.

During the last hundred years the population of Japan has increased greatly, and Japan has found it impossible to exist on her own production of foodstuffs. It is illuminating to note that, at the present time, Japan could only be self-sufficing if one acre of cultivated land supported four people. This is impossible, and Japan has attempted to relieve herself of the burden of over-population by the development of manufactures and the acquisition of colonies.

D. Manufactures

For manufactures, Japan has somewhat limited resources and has to import large quantities of raw cotton, wool,

and iron. Her home production of coal and petroleum is insufficient for her needs, but she has great water-power resources, and the development of hydro-electric power is here much advanced.

In spite of her handicaps, Japan has progressed and has become a great industrial country. Her huge population is a valuable asset, for a large amount of cheap labour is readily available. The chief manufactures are cheap cotton, silk, woollen and rubber goods, toys and ships. Owing to the fact that many of the raw materials have to be imported, industry is concentrated in the ports. Osaka (34° 40' N. 135° 40' E.), Yokohama, and Kobe (34° 45' N. 135° 10' E.) are the chief ports of Japan, and are thus the chief manufacturing towns. Tokyo (35° 48' N. 139° 45' E.) is also an important manufacturing town, as well as being the capital of Japan. It has a population of over 2,000,000.

E Empire Possessions

Japan's Empire possessions were of great importance to her. Taiwan, for instance, produces rice, tea, sugar, and coal. Korea is important for rice, raw cotton, silk and iron ore, while Sakhalin has coal and petroleum resources. These lands and Manchukuo also provided a useful area for immigrants from the over-crowded main islands.

These lands are now under the control of U.S.A. and Russia, and their loss is a serious handicap for Japan. This is particularly important in view of the rapid increase of population estimated as reaching 90,000,000 by 1960.

F Trade and Towns

The import trade of Japan proper consists mainly of foodstuffs and raw materials from her Empire, in addition, it includes raw cotton from India, America, and China, wool from Australia, rubber from Malaya, wheat from Canada and Australia, sugar from the East Indies, and rice from Burma and Siam.

The export trade consists mainly of her manufactured goods, which are produced and marketed so cheaply that she has control of much of the trade of this nature in South-east Asia, and is now even selling her goods in

countries such as the U.S.A. and Britain, which themselves manufacture similar products. At one time, for example, there was an immense market in India for cotton goods manufactured in Lancashire. This market has now greatly decreased as a result of two main factors: (a) the development of India's own home manufactures, and (b) the keen Japanese competition. This was the position up to Japan's entry into the war.

During 1946 Japan's exports were good, but the figures are becoming lower as her stocks of raw material dwindle. Very careful planning is needed if Japan is to recover.

ATLAS STUDY AND REVISION

Make sure that you can mark, accurately, on a blank map of Asia, all of the following—

- (a) The Equator, Tropic of Cancer, and latitude 60° N.
- (b) The Arabian Sea, Bay of Bengal, Yellow Sea, Sea of Japan, Sea of Okhotsk, Caspian Sea, Aral Sea, and Lake Baikal.
- (c) The Ural Mountains, Tien Shan, Hindu Kush, Pamirs, Himalayas, Arakan Yoma, Western and Eastern Ghats, together with the plateaux of South India, Tibet and Mongolia, the Gobi Desert and the Tarim Basin.
- (d) The rivers Tigris-Euphrates, Indus, Ganges, Brahmaputra, Irrawaddy, Menam, Mekong, Si Kiang, Yangtze Kiang, and Hwang Ho.
- (e) The Kuro Siwo and Kamchatka currents. The trade and monsoon winds. Areas which have: (i) Rain all the year round; (ii) most rain in summer; and (iii) little rain throughout year.
- (f) The natural regions.
- (g) Areas which produce gold, gems and rubies, silver, coal, petroleum, iron ore, tin and graphite.
- (h) Areas which produce rice, wheat, millet, oilseeds, cotton, sugar, tea, jute, soya beans, mulberry, and fish.
- (i) The Trans-Siberian Railway, together with the towns of Vladivostok, Harbin, Irkutsk, Tomsk (Leningrad, and Moscow).
- (j) The Bolan and Khyber Passes, and the towns of Quetta and Peshawar.
- (k) Karachi, Bombay, Colombo, Madras, Calcutta, Delhi, Nagpur, Hyderabad, and Rangoon.
- (l) The islands of Sumatra, Java, Borneo, and the chief towns of South-east Asia, especially Singapore.
- (m) Hong Kong, Canton, Shanghai, Hankow, Wei-hai-Wei, Peiping, Tientsin, and Nanking.
- (n) Manchukuo, Korea and Taiwan, the towns of Harbin, Moulten and Port Arthur, and the boundary between Manchukuo and the Soviet possession of Siberia.
- (o) Osaka, Yokohama, Kobe, and Tokyo.

EXERCISE 7

(1) Select *one* densely peopled area and *one* scantily peopled area in Asia, and describe the factors which have caused this distribution.

(2) Describe how the distribution of the chief agricultural products of India is controlled by rainfall.

(3) A tramp steamer visits the following ports. What commodities are the most likely to be taken on board at each port? For any two of these commodities, describe the factors involved in their production. (Refer to Chapter IV if necessary.)

Karachi, Bombay, Calcutta, Rangoon, Canton, Port Arthur, and Osaka.

CHAPTER VIII

AFRICA

BRITISH lands in Africa are—

The Union of South Africa (comprising the Cape of Good Hope, Natal, Orange Free State, and the Transvaal), the island of Mauritius, South-west Africa, Bechuanaland, Northern and Southern Rhodesia, Tanganyika, Zanzibar, Uganda, Kenya, British Somaliland, Nigeria, the Gold Coast, and Sierra Leone. Anglo-Egyptian Sudan is under the authority of a Governor-General who is appointed by Egypt and Britain.

1. Position

Africa lies almost entirely within the Tropics, extending as it does from latitude 35° S. to latitude 38° N. The exact position of the Equator and the two tropics should be carefully noted.

2. Physical Features and Rivers

Physically Africa can be divided into three parts: (a) the Atlas mountain region of the north-west; (b) the low plateaux region, which extends from the Atlas Mountains in the north-west to the southern and eastern margins of Belgian Congo and Anglo-Egyptian Sudan, and (c) the high plateaux which comprise the remainder of the continent.

In the Atlas Mountain system of the north-west occur areas of inland drainage which give rise to shallow salt lakes, known as *shotts*. Elsewhere in Africa are other regions of inland drainage, such as the Lake Chad area (14.0 N. 14.0 E.) on the low plateaux, and the areas surrounding Lake Rudolf (4.0 N. 36.0 E.) and Lake Ngami (20 30 S. 22 35 E.) in the high plateaux.

The large rivers, of which the most important are the Nile, Niger, Congo, Zambesi, Limpopo, and Orange, descend from the plateaux to the sea in a series of rapids. The difficult approach to the interior by means of rivers was

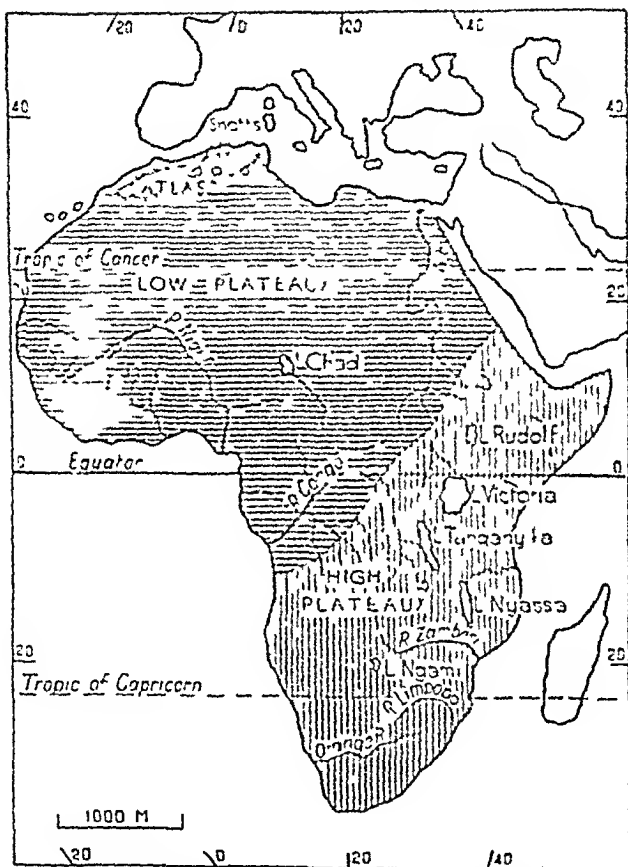


FIG. 57 CHIEF PHYSICAL FEATURES OF AFRICA

one of the factors which hindered exploration of Africa, and led to the use of the term "Dark Continent." Above the rapids the rivers are often navigable for considerable stretches. On the Nile, the rapids, or cataracts as they are here termed, are separated by 150-200 miles

The great lakes form another peculiarity of Africa's physical structure. Apart from Lake Victoria (1 0 S. 33 0 E), which is merely a relatively shallow depression on the plateau, these lakes, such as Rudolf, Albert (1.40 N. 31.0 E), Tanganyika (6 30 S. 29.40 E), and Nyasa (12 0 S. 34 30 E) occur in huge rift valleys

3. Climate

Climatic conditions in Africa are governed mainly by position and the apparent movement of the sun from tropic to tropic. During the northern summer, the sun is overhead near the Tropic of Cancer, and the Sahara Desert is a region of intense heat. (See July isotherms in Fig. 11.) Over much of the rest of Africa the temperature during this season lies between 60° F. and 80° F., with the exception of South Africa, where the average temperature is under 60° F. In the southern summer, the position is reversed, and the chief centre of heat lies rather in the Belgian Congo area. During this season the area under 60° F. lies along the Mediterranean coastlands of Africa. (See January isotherms in Fig. 12.)

The seasonal movement of the sun causes corresponding movement of the wind belts and rain areas, and nowhere is this more definitely shown than in Africa.

The lowland region between latitudes 5° N. and S. and the Gulf of Guinea coastlands experiences heavy rains all the year round (equatorial type), while from these limits to 15° N. and S. the rainfall occurs mainly during the summer season, and here is found the Sudan climatic type. This on the poleward side gives way to the hot deserts. In the Northern Hemisphere, the Sahara Desert is very extensive, since it lies on the westward margin of the huge land masses of Asia and Africa. Thus the trade winds have not blown over any stretches of sea, and are consequently dry. In South Africa, however, the trade winds have blown

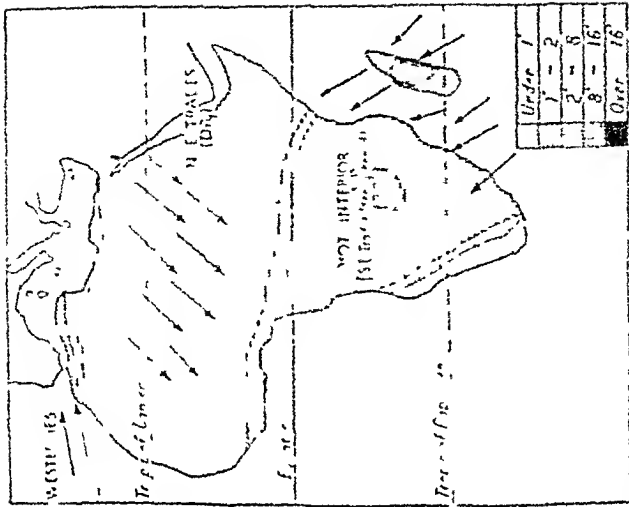


FIG. 58b. RAINFALL CONDITIONS OF AFRICA IN JANUARY (Winter in Northern Hemisphere here, summer in Southern Hemisphere)

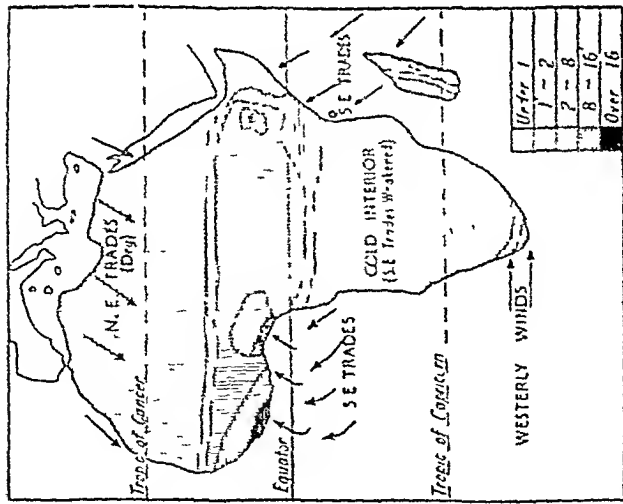


FIG. 58a. RAINFALL CONDITIONS OF AFRICA IN JULY (Summer in Northern Hemisphere here, winter in Southern Hemisphere)

over considerable stretches of ocean, and bring much rain to the eastern margins and some of the interior. The Kalahari is, for this reason, confined to a comparatively small area. In the tropical latitudes the rainfall resulting from the trade winds occurs mainly in the summer, since it is during this season that the region inland is heated and the action of the trade winds strengthened.

In the extreme north-west and south-west of Africa are found the regions which experience dry trade winds during the summer, and wet westerly winds during the winter. Here occurs the Mediterranean type of climate, and these two regions must be especially noted, since they are the only regions in Africa which experience a winter maximum of rainfall.

4. Natural Regions

These result from the climatic conditions outlined above, and are distributed as indicated in Fig. 59.

A. THE EQUATORIAL FORESTS

The equatorial forest area, comprising much of Belgian Congo and the Gulf of Guinea coastlands, is difficult to develop and exploit; for, in addition to the poor communications inland, the area is very unhealthy for the white races. Malaria, which results from the presence of the mosquito pest, is one of the main scourges.

In spite of the handicaps, many valuable forest and animal products, such as mahogany, oil palms, rubber, cacao, and ivory, are brought down to the seashores and exported. The island of Sao Thomé ranks high as an exporter of cacao. The banana forms an important article of diet for the natives, who also cultivate on small clearings crops, such as sugar cane, rice, and maize, which have been introduced into the region by Europeans.

The mineral wealth of the region is considerable, but has not been fully exploited. The chief production of these commodities at the present time is in gold from the Gold Coast, tin from Nigeria, and copper from the Belgian Congo.

The foreign trade of the area, which is handled by Lagos, Freetown, Matadi (6 0 S. 13.40 E.), and many smaller ports

along the coasts, consists largely of the exchange of raw materials for manufactured goods. Palm nuts and oil, ivory, cacao, rubber, and minerals are exported, while machinery and clothing are the chief imports.

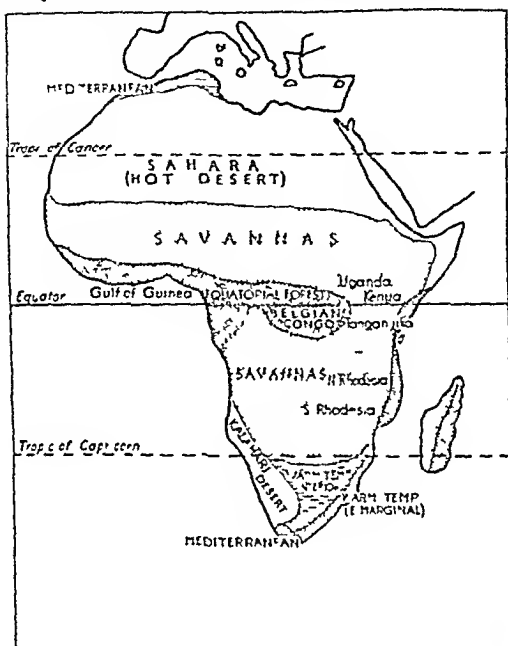


FIG. 59. DISTRIBUTION OF NATURAL REGIONS IN AFRICA

B THE SAVANNA LANDS

These huge areas of natural grass and parklands have in the past been mainly given over to primitive agricultural and pastoral activities. Of recent years, however, they are becoming more fully developed. Towards the north of the Guinea equatorial forests are grown cereals such as millet, rice, and maize, for consumption by the natives, and the production of cotton is increasing. In the southern

part of Anglo-Egyptian Sudan there is a similar production of crops, while cattle-raising is also important. This country is, however, more greatly developed towards the drier north, where irrigation from the Nile headstreams is practised

1. British East Africa

British East Africa, which includes Uganda, Kenya, and Tanganyika, lies for the most part on a plateau above 3000 ft., and to this factor it owes its savanna characteristics. Owing to the altitude the climate is cool enough for Europeans to develop the region, only requiring native labour for the heaviest work. Here the tropical grassland and high altitude make possible the keeping of cattle and sheep, an activity which will probably become of great importance in the future, for the sheep and cattle lands of temperate lands are being increasingly given over to arable farming. The activity of the tsetse fly is here, as in all tropical Africa, a great drawback to progress. At present the traffic in cattle products is small, the only export of note being that of hides and skins from Kenya and Tanganyika. The soil over considerable areas is very fertile and on the plateaux the natives cultivate cotton, coffee, and maize. The land, however, is not fully developed, and the entry of large-scale scientific farming may increase manifold the production of this area. This is the region of the Government sponsored ground-nut scheme. The chief trade of East Africa lies in the export of coffee, maize, and cotton, and the import of cotton goods and agricultural implements. The development of this area in production of groundnuts, sponsored by the British Government, is proceeding apace.

The outlet for this territory is along the eastern shores where the ports of Mombasa (4° 0' S. 39° 40' E.) and Dar-es-Salaam (6° 50' S. 39° 12' E.) have railway communication with the interior. An important inland town is Nairobi (1° 15' S. 36° 50' E.). Zanzibar, on the island of that name, is an important port and trading centre.

2. Northern Rhodesia, Southern Rhodesia and Bechuanaland

Northern Rhodesia, Southern Rhodesia, and Bechuanaland also lie in the savanna region, and here are found

activities similar to those engaged in in the regions of Eastern Africa. Northern Rhodesia, however, is still largely unknown, and since its climate is unhealthy for Europeans, the white population is very small. Stock-raising is chiefly important at present, but considerable areas are reputed to be fertile and suitable for cultivation, and it would appear that the present production of crops is small compared with the possibilities. Maize is the chief cereal production, but the export trade, both in this crop and cattle products, is small.

Southern Rhodesia, which has climatic conditions suitable for European settlement, is in a far more advanced state. Cattle rearing is important, and it is expected that in course of time this region will rank as an exporter of meat as well as of hides and skins. Maize, tobacco, and cotton are the chief cultivated crops, while the production of oranges and grapes is increasing.

Both Northern and Southern Rhodesia are rich in mineral wealth, and the former is an important producer of copper in the Katanga region. In Southern Rhodesia, gold, chrome, and coal are produced in considerable quantities.

The most important towns in Southern Rhodesia are Salisbury (17° 50' S 31° 0' E) and Bulawayo (20° 7' S 28° 38' E). Rhodesia is unfortunate in that it has no seaport, and the chief outlet is by means of the port of Beira, in the Portuguese territory of Mozambique.

The chief exports from Northern and Southern Rhodesia are the minerals, together with tobacco, maize, cattle, and fruits, while imports consist largely of cotton manufactures, motor vehicles and motor spirit, sugar, and tea.

Bechuanaland, towards the south-west, gradually merges into the Kalahari Desert. The population consists mainly of native peoples, who cultivate the wetter eastern regions by primitive means, and produce crops of maize and Kafir corn. Over most of Bechuanaland, however, the keeping of cattle, sheep, and goats is the most important human activity.

3. Difficulties of Development in the Savanna

The savanna regions of Africa are, agriculturally, potentially rich, but before they can be fully developed, many

obstacles have to be overcome. The climate is in some regions unsuited for white labour, and the native generally prefers to raise just sufficient foodstuffs to meet his own needs. He is often hostile to the plantation system or large-scale farming, and thus the labour question is a very real one. For example, the British Cotton Growing Association, which wishes to foster cotton production in the Empire, has estimated that the regions of Northern Nigeria, Southern Sudan, and British East Africa could increase their cotton production fifty-fold. The production of cotton requires a large reserve of cheap labour, and herein lies one great obstacle to progress.

The poverty of communications is a further hindrance to development, but the further construction of railways will doubtless, in time, allow of the greater exploitation of the interior. It was indicated earlier in this section that the tropical grasslands may in the course of time become the great world centres for cattle products. Before this can happen, however, the breed of cattle must be improved considerably by the importation of more foreign stock, and means must be discovered of overcoming the tropical cattle diseases such as rinderpest, and the activities of the tsetse fly.

C. THE HOT DESERTS

The Sahara and Kalahari are the two examples in Africa of the Hot Desert climate, and their characteristics should be revised (Chapter III).

The position of Walvis Bay (22° 40' S. 14° 30' E.), which possesses a good harbour, should be noted. This port is associated with the whaling industry in the South Atlantic, and also with the export of minerals.

In the Sahara region settlement is confined to the oases, the margins, and the Nile valley of Egypt and Anglo-Egyptian Sudan. The influence of this river is so great that it must be fully considered.

1. The Nile Valley

The river Nile has two main headstreams, the White Nile and the Blue Nile. The former rises in Lake Victoria, and since it is fed by the equatorial rains it has a consistent

flow all the year round. The Blue Nile, on the other hand, rises among the mountainous regions of Abyssinia, and is thus fed mainly by summer rains. Again, during the summer months, the melting snows of the mountains add to the waters of the Blue Nile, and the two factors of summer rainfall and melting snows are responsible for the flooding of the lower Nile, upon which depended the irrigation and cultivation of Egypt and the Sudan in early days.

The two main headstreams join near Khartoum (15° 40' N. 32° 52' E.) to form the Nile proper. The course of the river across the desert is marked by a series of six stretches of rapids, known as cataracts, a factor which hinders navigation on the Nile. Below Cairo the Nile opens out to the Mediterranean in the form of a delta.

2 Agriculture

Throughout the Sudan region to the north of Khartoum, and in Egypt, the climatic conditions are of the Hot Desert type, and cultivation depends entirely on irrigation. In earliest days the river was allowed to flood the country during the high water season, and crops were produced on the areas covered by the silt of the river. The construction of low banks round plots of land helped to hold the water and silt, and led to the designation of "basin irrigation" being applied to this type. This method of irrigation had serious disadvantages. Any failure of the summer rainfall of the Upper Blue Nile resulted in lack of flood water for Lower Sudan and Egypt, and the production of crops was rendered difficult and even impossible. Again, there was but one period of flood, and crops could only be grown during one period of the year. To overcome these difficulties, modern methods of irrigation have been established. Huge barrages and dams have been constructed across the river at Sennar, Asyut, Aswan, and below Cairo. By these means the river can be ponded back and large reservoirs made. This water can be released when required, and distributed over the regions on either side of the river by means of canals. This distribution can

take place at any required time, and such perennial irrigation allows cultivation to take place all the year round.

In the summer, cotton and sugar are the chief crops grown. In the autumn maize and millet are cultivated, and during the cool season or winter, the land is given over to the production of wheat, barley, and beans. Rice is chiefly important in lower Egypt and the delta.

As a result of this intensive cultivation the density of population in the lower Nile valley is great, and in Egypt exceeds 1000 a square mile. The Sudan territory, however, is less densely peopled.

3. Main Towns

In the Sudan, *Khartoum* is the chief town and administrative centre, and in addition possesses railway communication, via Atbara, with the Red Sea outlets of Port Sudan and Suakin.

In Egypt, *Cairo*, with a population of over 1,000,000 is a centre of communications, an important market and commercial town, and the capital of Egypt. Native craft industries are still engaged in, and manufacture of low grade cotton is an activity shared with *Alexandria*. The ginning of cotton for export is also carried out largely by these two towns.

The position of *Alexandria* is interesting. Its situation to the west of the delta is due to the fact that the tides and currents move from west to east. Although very weak, these movements of the waters cause a slight drift of silt and sediment eastwards, but *Alexandria's* position renders it immune from any danger of this type. This port dominates the trade of Egypt.

At the northern end of the Suez Canal lies *Port Said*, a point of call for nearly all shipping using the Canal. Owing to this position, its activities include the repairing and the refuelling of ships (with coal imported largely from Great Britain).

4. Trade

From Anglo-Egyptian Sudan the chief exports are cotton, gum collected by the natives from the southern

forest regions, and cattle from the savanna grasslands. The chief imports are of cotton goods, machinery, and sugar.

In Egypt more than four-fifths of the total export is of raw cotton, and the remainder is made up largely of cotton seed, seed oil, and seed cake. The huge population of Egypt creates the need of the import of foodstuffs such as flour, sugar, and coffee. The main imports, however, are raw materials and manufactured goods such as coal, timber, iron and steel goods, and cotton goods.

The trade between Anglo-Egyptian Sudan and Egypt is small, and is handled by the frontier town of Wadi Halfa.

D THE NORTHERN MEDITERRANEAN REGION

Morocco, Algeria, and Northern Tunisia experience this type of climate. These three states have somewhat similar physical features, in that each possesses a coastal plain, mountain chains such as the Tell Atlas and Saharan Atlas, and interior plateaux such as the Plateaux of the Shotts.

Morocco is more exposed to the rain-bearing Westerlies in winter than the other States, and in this State crops can be grown without irrigation.

In Algeria and Tunis irrigation from the mountain streams is practised, and the coastlands of all three states produce barley, wheat, millet, maize, tobacco, and Mediterranean fruits—oranges, olives, and figs.

In the coastland of Morocco many cattle are kept.

The interior mountains are forested and the cork oak is of chief importance. The dry plateaux are given over largely to the keeping of cattle, sheep, and goats by nomadic tribes.

The trade of these Mediterranean states is mainly with France. This trade consists of the export of wheat, barley, wine, and tobacco, and the import of textiles and machinery, while Algeria in addition exports iron ore and phosphates. The chief towns are the ports, of which Casablanca (33° 35' N. 7° 30' W.), Oran (35° 45' N. 0° 38' W.), Algiers (36° 35' N. 3° 5' E.), and Tunis (36° 50' N. 10° 13' E.) are the most noteworthy.

The other Mediterranean region of Africa lies in the south-west of Cape Colony, and here the study of Africa

on a basis of natural regions is forsaken in favour of a regional study of a very important area—the Union of South Africa

E THE UNION OF SOUTH AFRICA

1. Physical Features

South Africa lies mainly on the plateau, but towards the margins this gives way to coastal plains. The change is abrupt in the south-east and the edge of the plateau is marked by large mountain ranges, such as the Drakensberg. In the south, the descent to the coast is made by a series of steps, of which the Great Karroo and Little Karroo are two well-marked examples.

The main rivers on the plateau are the Limpopo with its tributary the Vaal, and the Orange River

2. Climate

The temperature of South Africa is sub-tropical in type, and the interior ranges from 70° F. in January (the summer season) to 50° F. in July. On the coasts, the presence of ocean currents modifies these conditions. During the summer season the west coast is cooled by the cold Benguela current, and the temperature during January averages 60° F., while on the east coastlands the warm Mozambique current causes a raising of the winter temperatures.

South Africa experiences a well-marked seasonal rainfall. In the southern summer, the interior is very hot, and the South-east Trades, which have moved southward with the sun, blow in from the Indian Ocean with considerable force. This causes the east coast and mountains to experience a heavy summer rain. In blowing over the eastern coastlands and mountains, the winds lose a considerable amount of their moisture, and thus, while the eastern half of South Africa experiences summer rain, the amount decreases inland. By the time they reach the western half they are dry winds, and thus the whole of South Africa west of a line drawn from Port Elizabeth (34° 0' S. 25° 42' E.) to the mouth of the Orange River, is a region of summer drought.

During the southern winter season, the interior is cold,

and outblowing winds result. The main wind belts have moved northward, and thus the south and south-western regions of Cape Colony lie in the westerly wind belt. A Mediterranean type of climate (winter rains) is experienced, therefore, by this comparatively small strip of territory. The winter rain and summer drought make this region eminently suitable for the production of wheat, the vine, and Mediterranean fruits. The heavy summer rainfall of the eastern states is better suited to the production of such crops as maize, tobacco, cotton, and sub-tropical fruits.

3. Agriculture

Agriculture and the exploitation of mineral wealth comprise the main occupations of South Africa, and while minerals have in the past been the chief factors in the export trade of South Africa, agriculture is gradually increasing in importance. The rainfall over considerable tracts is insufficient for crop production, but irrigation projects are developing, and will in course of time allow of the fuller development of the land. Extensive farming methods, characteristic of newly developed lands, are used, and the adoption of more intensive methods in the future will doubtless aid the irrigation projects in making South Africa a great producer of foodstuffs and raw materials.

MAIZE

This is the main cereal production of the Union and is used in various ways. It forms the staple crop of the natives, is used as fodder for cattle, and is exported in considerable quantities. While its production is widespread in the moist eastern regions, the chief areas under maize are in Southern Transvaal and Orange Free State. These areas, together with the eastern part of Cape Colony, form a part of the plateaux often referred to as the High Veld.

TOBACCO

This crop is also confined to the wetter regions, and its production has shown a considerable increase in recent years.

COTTON

This crop demands greater heat and moisture than maize, and is cultivated mainly along the eastern coastlands and in Northern Transvaal

WHEAT

Insufficient wheat is grown in the Union of South Africa to meet requirements, and the home production is supplemented by imports. The chief area engaged in producing wheat is in the south-west, where it is sown during the winter rainfall period and harvested in early summer.

FRUIT

Fruit production, like that of tobacco, has made great strides, and the export trade, much of which is with Great Britain, is of increasing value. The seasons of Europe and South Africa are reversed, and thus, in the Union, the fruit ripens and can be exported at a time when the regions of the Northern Hemisphere cannot produce their own requirements. Together with this advantage lies the fact that the fruit production of South Africa is varied, including as it does the citrus fruits (e.g. oranges and grape-fruit), deciduous fruits (e.g. apples, peaches, and apricots); grapes, and the sub-tropical products of the eastern coastlands (e.g. bananas, pineapples, and melons).

CATTLE AND SHEEP

Cattle are found in large numbers on the moister parts of the plateau, especially in Northern Transvaal and on the High Veld, where they live both on the natural grassland and on maize fodder. Considerable quantities of beef, dairy produce, and hides are exported. Sheep are concentrated chiefly in the drier areas of the High Veld, and are responsible for the chief agricultural export of the Union, viz. wool. Much of this produce goes to Europe.

4. Mineral Wealth

The exploitation of mineral wealth is still the leading occupation of the Union, and one mineral alone—gold—is responsible for more than half the total export. Again,

South Africa produces more gold than the rest of the world put together, and almost all the world's diamonds.

GOLD

The chief mines are to be found in the area around Johannesburg, which town owes its development and prosperity almost entirely to this factor. The value of output of gold in 1947 was £96,579,628

DIAMONDS

The most important area of production is around Kimberley, but other valuable diamond mines are being worked near Pretoria (25 36 S 28 12 E)

COAL

The coal reserves are considerable and are worked chiefly in the Transvaal and in Natal. This latter field supplies coal for ships calling at Durban.

INDUSTRY

The war has been a great stimulant to the development of industry. Pretoria has become the centre for the non and steel industries, while other towns, notably Capetown, are developing textile and leather industries

5. Railway Communications

The rivers of South Africa are useless for navigation, and development has depended chiefly on the construction of railways. The main trunk lines run from the ports to the chief inland centres. From Capetown the main line runs to Kimberley and then on to the Rhodesian town of Bulawayo. From Durban, in Natal, the main line runs by the coal-field areas, and crosses the Drakenberg into the Transvaal, where at Johannesburg it meets a branch of the line from Capetown. Other lines from Durban run along the coast, and to Ladysmith (28 36 S 29 42 E) in the interior.

In the Transvaal there is an important railway line apart from those already mentioned. It is the one which links up Lourenço Marques, the port for the Transvaal, with the interior.

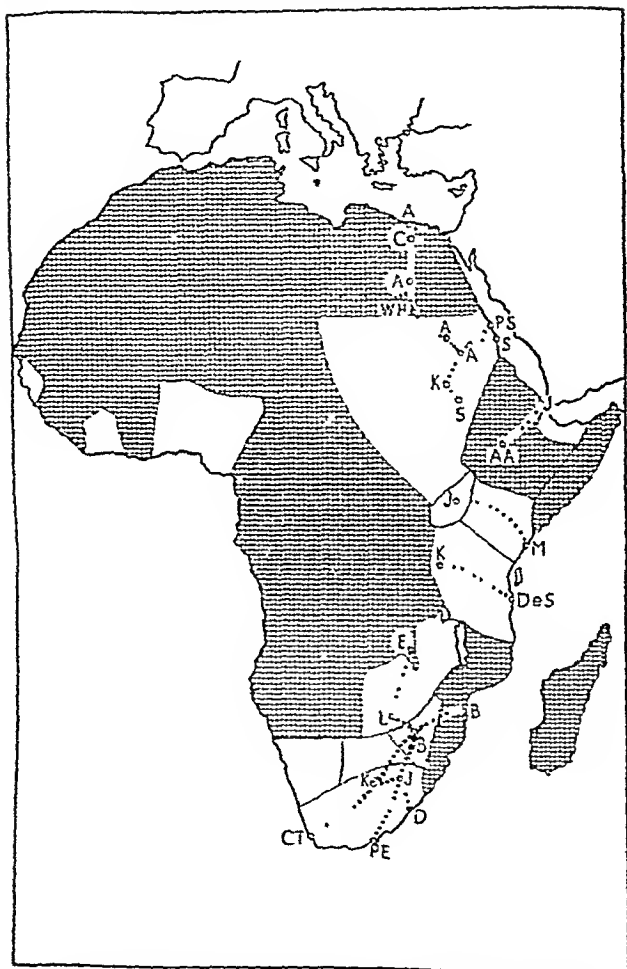


FIG 61. MOST IMPORTANT RAILWAY LINES IN AFRICA
Identify the main towns (indicated by initials) and the British territories (left unshaded)

6. Trade

The export trade of South Africa is mainly in the form of raw materials. Gold, wool, hides and skins, fruits, dairy produce, and diamonds are of chief importance. In addition, coal is supplied to visiting ships.

The import trade, mainly of manufactured goods, includes textile manufactures, iron and steel goods, machinery, cars, and oil.

The chief ports handling this trade are Capetown, Port Elizabeth, Durban, and Lourenço Marques.

F. RAILWAYS IN THE REST OF AFRICA

Railway construction in Africa is of two main types, (a) to connect up the ports with the interior, and (b) to circumvent the rapids of the rivers and link up navigable stretches of these waterways. There is no transcontinental line, although a Cape to Cairo railway has been projected for many years.

1. Egypt

The main line runs from the port of Alexandria to Cairo, Aswan, and Wadi Halfa. From here the line cuts off a long navigable loop of the Nile, and runs across the desert before meeting the river above Atbara (17°42' N. 31°0' E.). A branch line runs from Atbara to the Red Sea ports of Suakin (19°30' N. 37°25' E.) and Port Sudan, while the main line runs on to Khartoum and Sennar.

2. Eastern Africa

Here the lines, most of which connect up the interior with the coast, are disconnected. The chief lines run from Addis Ababa (9°0' N. 38°43' E.) in Italian Abyssinia to the French port of Jibuti (11°30' N. 43°10' E.); from Jinja (0°30' N. 33°15' E.) in Uganda to Mombasa; and from Kigoma (4°43' S. 29°40' E.) in Tanganyika to Dar-es-Salaam.

3. Northern and Southern Rhodesia

The main lines here form a continuation of the Union railways. From Kimberley and Pretoria communication

is made with Bulawayo, where a junction is formed from Johannesburg and the south-east. Bulawayo is also connected with Beira on the east coast, and with Livingstone (17 48 S 26 0 E), Victoria Falls (on the Zambesi), and Elizabethville (11 30 S 27 33 E) in Northern Rhodesia

Mention must be made here of a road which now runs through the entire length of the continent

It runs south from Algiers to Kano (Nigeria) and then south east to Stanleyville (Belgian Congo) and Nairobi (Kenya). From there it goes south west to Broken Hill in Northern Rhodesia and on to Johannesburg and Capetown. The road has developed as a result of the war and is fully signposted

G ISLANDS OFF THE COAST OF AFRICA

1. Madagascar

Madagascar is a French possession. It produces and exports rubber, cattle hides, rice, and graphite. The island is not yet fully developed

2. Mauritius

This is a British possession, and exports large quantities of sugar and hemp

3. The North-western Islands

These include the Cape Verde Islands, Madeira, Azores, and the Canary Islands. Bananas, early vegetables, tomatoes, and coffee are exported, mainly to the European countries

ATLAS STUDY AND REVISION

Make sure that you can mark, accurately, on a blank map of Africa, any of the following—

- (a) The Equator, Tropics of Cancer and Capricorn.
- (b) The Atlas Mountains, Plateaux of the Shotts, the Low Plateau, High Plateau, Drakensberg Mountains, High Veld, Great Karoo, and Little Karoo.

(c) The Lakes Chad, Rndolf, Ngami, Victoria, Tanganyika and Nyasa, and the rivers Nile, Niger, Congo, Zambesi, Lampopo, and Orange.

(d) The trade winds, together with regions which have (i) rainfall all the year round, (ii) summer rainfall maximum, and (iii) summer drought and winter rainfall.

(e) Areas which produce mahogany, oil palm, rubber, cacao, ivory, bananas, sugar cane, rice, maize, cotton, coffee, sugar, tobacco, fruits, cattle, sheep, wheat, and wine.

(f) Areas which produce gold, diamonds, tin, copper, and coal.

(g) The main towns and ports, such as Lagos, Freetown, Mombasa, Dar-es-Salaam, Nairobi, Zanzibar, Salisbury, Bulawayo, Beira, Khartoum, Sennar, Aswan, Cairo, Alexandria, Port Said, Port Sudan, Snakin, Wadi Halfa, Capetown, Durban, Lourenço Marques, Kimberley, Johannesburg.

(h) The main railway lines.

(i) The islands of Madagascar, Mauritius, Madeira, and the Canaries.

EXERCISE S

(1) What do you understand by the expression "Rains follow the sun"? Illustrate your answer from climatic conditions found in Africa

(2) Compare and contrast the Nile Valley and the Ganges Valley as fully as you can. (Consider position, physical features, natural regions and vegetation, human activities, and density of population.)

(3) Select *one* densely peopled area and *one* scantily peopled area in Africa, and describe the factors which have resulted in this distribution.

(4) Our possessions in tropical Africa could supply us in Britain more adequately with commodities of which we now purchase large quantities elsewhere. Select two of these commodities, state where they can be produced and ports from which they can be exported, and write notes on the factors involved in their production

coast runs a mountain system, which has various names in different parts, but the whole is often referred to as the Eastern Highlands. The mountains run close to the eastern seaboard and leave but a narrow coastal plain.

Off the coast of Queensland lies the Great Barrier Reef,

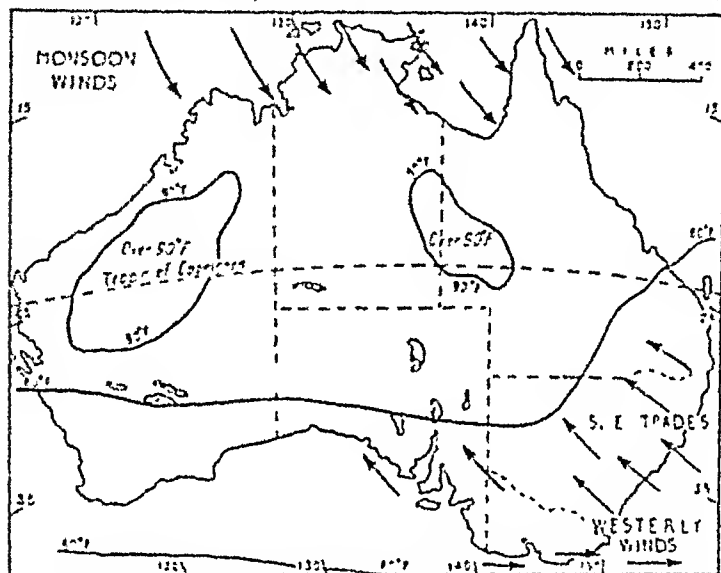


FIG 63A. TEMPERATURE AND WIND CONDITIONS OF AUSTRALIA IN JANUARY

a coral formation which constitutes such a danger to shipping that sailing ships do not travel after nightfall.

Towards the west, the Eastern Highlands give way to gentle slopes, and eventually to a great Central Lowland area. In the southern part of the Central Lowlands flow the most important rivers of Australia—the Murray and Darling. These two rivers have most of their headstreams in the Eastern Highlands, and unite before reaching the sea near Adelaide. Most of New South Wales and Victoria, and a considerable area in Southern Queensland, lie in the drainage basin of the Murray-Darling system.

In the northern part of the Central Lowland, around the

Gulf of Carpentaria, the rivers all flow to the sea, but those of the central plain, on the other hand, have no such outlet, and empty into a series of inland lakes. Lake Eyre (28° 30' S. 137° 20' E.) is the most noteworthy example. Much of South-western Queensland, the northern part of the State

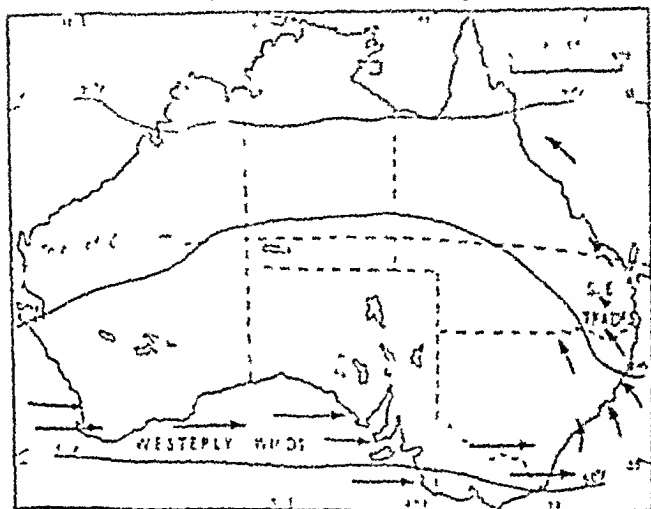


FIG. 6B. TEMPERATURE AND WIND CONDITIONS OF AUSTRALIA IN JULY

of Central Australia, and the north eastern part of the State of South Australia, are included in this great area of inland drainage.

The rest of Australia, to the west of the central plains, consists mainly of a plateau, which gives way to a very narrow coastal plain towards the seaboard.

C Climate

During the hot season (November to April), the sun is overhead in that part of Australia north of the Tropic, and the continent becomes very hot. Note the position of the January isotherms in Fig. 6A. As a result of this intense

heat, winds are inblowing, and the North-east Trades of the Northern Hemisphere are drawn across the Equator and, as the north-west monsoon, bring a considerable rainfall to the northern regions of Australia. Elsewhere in Australia, the South-east Trades are in evidence, and

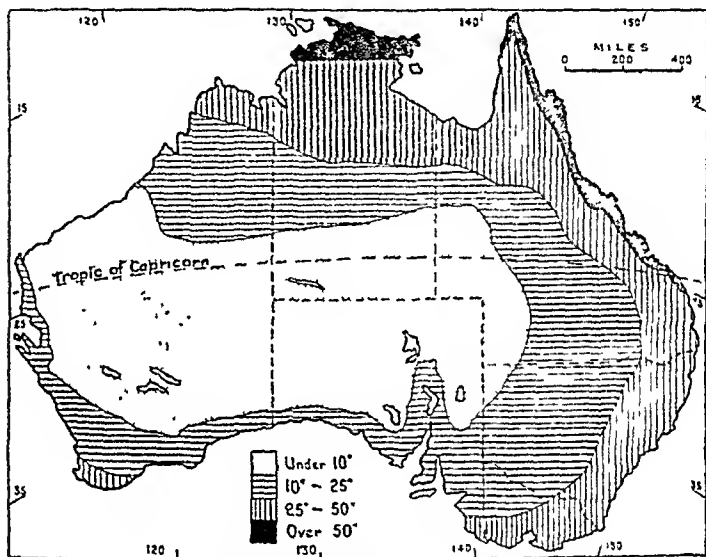


FIG 64 ANNUAL RAINFALL OF AUSTRALIA

bring a considerable amount of rain to the eastern coastlands and mountains. In crossing the mountains, these winds lose most of their moisture, and the amount of rainfall received decreases with distance inland.

In the cool season (May to October) the sun and wind belts have moved north. The July isotherm of 60° F. which runs roughly along the Tropic of Capricorn, indicates the temperature conditions. The northward movement of the main wind belts brings the south-western and southern regions of Australia within the wet westerly wind belt. These regions, therefore, experience winter rains, and summer drought—the Mediterranean type of climate. The remainder of the country experiences the South-east Trades,

and thus the eastern coastlands and mountains have rain all the year round

The total effect of these factors on rainfall in Australia is shown in Fig 61. Notice the poor rainfall over most of the interior

Tasmania lies in the belt of westerly winds throughout

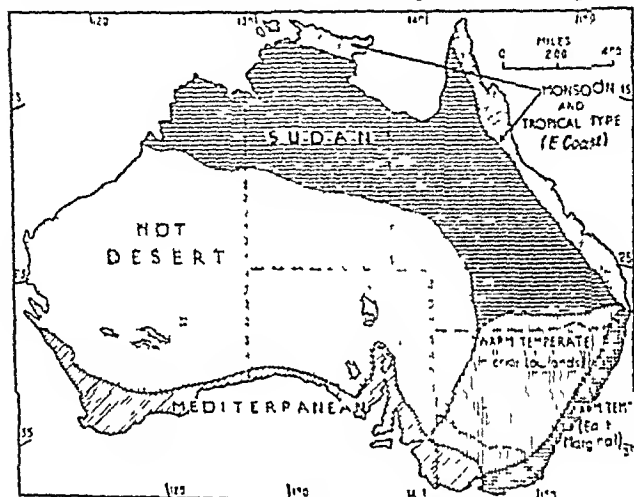


FIG. 65 NATURAL REGIONS OF AUSTRALIA

the year, and thus experiences an adequate, well-distributed rainfall

D Natural Regions and Agriculture

1. MONSOON AND SUDAN TYPE

The Monsoon Region includes the forest vegetation area along the northern coasts, and that part of Queensland to the east of the mountains. Mangroves, palms, and similar vegetation of a tropical nature are found here, and give place inland to forests containing the eucalyptus tree. Off the coasts, an important pearl fishing industry has developed

Along the wetter coastlands, the climate is such that it should be possible to grow large crops of cotton, rice, sugar cane, and tropical fruits. Apart from Queensland, however, little development has taken place. Along the coastal plain of Queensland are grown considerable quantities of sugar, maize, and such tropical fruits as the banana, orange, and pineapple, while many cattle, kept for dairy purposes, are to be found towards the south, especially around Brisbane (27.28 S. 153 0 E.) and Rockhampton (23 25 S 150 30 E)

Inland, the forests give way to tropical grassland, and this savanna territory supports considerable numbers of cattle. The most highly developed state in this respect is again Queensland, where large numbers of beef cattle and sheep are allowed to roam in search of pasturage, especially on the downland region west of the mountains.

Towards the interior margin of the savanna, the decreasing rainfall renders herbage more coarse and sparse, and, as a result, sheep are of more importance than cattle.

The scanty and unreliable nature of the rainfall over much of the cattle and sheep country renders the problem of water supply a very real one. The interior lowlands of Queensland, New South Wales, and South Australia possess considerable quantities of underground water, and bores are put down to bring this water to the surface. These areas are referred to as "Artesian Basins." The further development of this supply of artesian water will make the keeping of cattle and sheep less dependent on rainfall, and consequently less of a gamble for the farmer. In the past, periods of drought have caused the loss of many animals and spelt financial disaster for many owners.

As a result of this large-scale cattle and sheep farming, Queensland ranks as an important producer of beef, hides and skins, and wool.

Much of the area is still untouched by rail, and cattle are often driven long distances to the markets and railheads.

2. THE HOT DESERTS

Towards the margins of the Savanna, the vegetation gives way to poor growths, such as mallee scrub and stunted eucalyptus, and finally to the sand ridge desert of Spinifex

and Saltbush. This region, which includes most of Central Australia, South Australia, and Western Australia, is practically uninhabited.

3 THE WARM TEMPERATE (EAST MARGINAL)

This area, which includes parts of New South Wales and Victoria, includes the mountains and eastern coastlands. The region has an adequate, well-distributed rainfall, and the natural vegetation is forest growth. The mountains are still well covered with forests, in which important species are hardwoods, such as eucalyptus (the varied species of which are widely used for railway sleepers, furniture, and joinery), gum trees, and acacias.

The fertile coastal plains have been developed agriculturally, and maize is the chief cereal of importance. The moist climate is well suited to dairy cattle, and this region contains more than 60 per cent of the dairy cattle in the whole of Australia. This farming is on a less extensive scale than that of the beef producing ranches of the Savannas, and is closely allied to arable farming, for the cattle are often fed on fodder crops such as wheaten or oats hay. Butter, cheese, and preserved milk are all exported, largely to Britain.

4 WARM TEMPERATE (INTERIOR LOWLANDS)

In crossing the mountains, the trade winds lose much of their moisture, and as a result the plainland regions of New South Wales and Victoria experience a rainfall which decreases from about 25 inches near the mountains to less than 10 inches on the western boundaries. The temperate grassland which results from the climatic conditions is excellent material for development by farmers.

In the moister eastern regions, the grass is rich, and as a result many cattle are kept. Towards the drier west, the cultivation of wheat and the keeping of sheep are of greater importance, while, on the borders of the desert, arable agriculture is impossible, and the land is given over almost entirely to wandering flocks of sheep. Lucerne is a fodder crop of importance in the arable and cattle farming areas.

The small amount of rainfall towards the centre and western margins of the temperate grassland area has led

to the development of irrigation from the Murray-Darling river system. The most important area irrigated at present is that of the Riverina (35° 0' S. 146° 0' E.), a stretch of country lying between the River Murray and the River Murrumbidgee. The chief crops produced are fruits such as oranges, lemons, peaches and apricots, rice, vines, and lucerne. Apples are grown in Victoria, especially toward the south, often without the aid of irrigation.

Since the River Murray forms a boundary between New South Wales and Victoria, administrative difficulties often arise when new irrigation projects are proposed, but in spite of this the areas under irrigation are increasing. The Mildura area (34° 10' S. 142° 11' E.) is, outside the Murrumbidgee, the chief irrigated area of note.

5. THE MEDITERRANEAN REGIONS

The Mediterranean type of climate is experienced in the south-western division of Western Australia, the south-eastern coastlands of South Australia and South-western Victoria. Much of the land, especially in the wetter regions, is forested, and valuable hardwoods, such as karri and jarrah, are important productions—especially from the Mediterranean region of Western Australia. In the moister regions, too, dairy farming has developed, and is of increasing importance. In this, the Mediterranean regions of Australia are unusual, for cattle are generally unimportant in this climatic type.

Inland, the belt of dairy farming and timber production gives place to regions of fruit and cereal cultivation and considerable quantities of wine, oranges, and wheat are exported.

Still farther inland the rainfall is insufficient for arable farming, and the land is given over to sheep.

In South Australia, the river Murray flows through a region which experiences the Mediterranean type of climate, and here the river waters are used for irrigation. Wine and Mediterranean fruits are the chief crops.

F. Mineral Wealth

As with many newly discovered countries, it was the lure of mineral wealth, especially of gold, which attracted

colonists in large numbers, but many of these immigrants later turned to agriculture and became settlers

1 GOLD

The output of gold has decreased during the present century, and many of the mines which were once famous now produce but little gold. Coolgardie (31° 0' S 121° 0' E), Kalgoorlie (30° 39' S 121° 28' E), Ballarat (37° 30' S 144° 0' E), and Charters Towers (20° 0' S 146° 20' E.) are still centres of gold production, but the total output of Australia is comparatively small.

2 SILVER AND LEAD

Silver and lead ores are often found together in the same rock formation. The value of the annual production of these two minerals now easily exceeds that of gold, and most of the silver-lead output comes from one area—Broken Hill (32° 0' S 141° 30' E), in New South Wales. The mining of these resources has resulted in the rise of the town of Broken Hill, a settlement of over 30,000 people in the desert. (See Fig. 65.) Much of the ore is sent by rail to Port Pirie (33° 0' S. 138° 0' E.) for smelting. The Broken Hill region also produces all Australia's output of zinc.

Mount Lyell, in Tasmania, is another centre of silver-lead production.

3 COPPER

This is produced from all the States, and especially from the Cloncurry region (20° 30' S. 140° 30' E.) of Queensland and the Highlands of Victoria. Much copper is also produced from the Mount Lyell region.

4. TIN

New South Wales and Queensland are the principal producers.

5 IRON ORES

Iron ores are scattered, and they are, as yet, but little developed. Nearly all Australia's present production is from Iron Knob, where the ore is 60 per cent pure. From here railway connexion is made to the port of Whyalla (33° 0' S 137° 30' E), from which iron ore is exported to the

iron and steel manufacturing districts of Newcastle (33.0 S. 152.0 E.). Parts of Western Australia are believed to be very rich in iron ore, but little has been done to develop these resources.

6. COAL

Coal is found in all the States, but the richest and most productive field is in New South Wales. The chief mines are west of Newcastle and Sydney. This coal is used mainly in manufacturing, e.g. iron and steel goods, in railway locomotives, and in the coaling of vessels. It has recently been announced (1948) that new mines are being opened in Gippsland, east of Melbourne, Victoria.

F. Industry

Industrial activity in Australia is concerned largely with the preparation of agricultural produce for export. This class of industry includes the preparation and treatment of wheat, wool, fruit, timber, and cattle products, such as meat and dairy produce.

Other manufacturing activities include the clothing and textile industries, which are associated with the home production of wool, at Sydney, Melbourne, and Geelong (38.0 S. 144.30 E.), and the iron and steel industries of Newcastle. In spite of the development of these industries, Australia is still predominantly pastoral and agricultural, and must depend on other countries for most of her manufactured requirements.

G. Communications

Excepting parts of the Murray-Darling system, the rivers of Australia are useless for transport purposes, and the opening up of the continent has depended to a large extent on the railways. These have been built to link up the mining, pastoral, and agricultural interior with the seaports. Each State has developed its own lines, and this fact has caused considerable confusion, for the gauges vary. Queensland, Western Australia, and parts of South Australia have built their railways with a "narrow gauge" (lines 3 ft. 6 in. apart), New South Wales and part of South Australia use the "standard" (lines 4 ft. 8½ in. apart), whereas Victoria

2 NEW SOUTH WALES

Here the lines radiate from Sydney. Connexion is made with Melbourne, Broken Hill, and Port Pirie. Note that there is no coastal railway from New South Wales to Victoria

3. VICTORIA

The chief lines radiate inland from Melbourne.

4. SOUTH AUSTRALIA

This State uses all three gauges, and the chief lines run from Port Augusta (32° 30' S. 138° 0' E) and Adelaide. Connexions are made with Melbourne, Sydney, Perth, and northwards into Central Australia. Alice Springs (24° 0' S. 134° 0' E) is the terminus of this last-named line, but it is proposed to extend it and complete the trans-continental route from Port Augusta to Port Darwin

The roads of Australia, apart from the environs of the main cities, are generally poor. Aerial development has proceeded apace of recent years, and there is now regular communication of this type between the main cities

H. Population and Chief Towns

The total population of Australia, according to the most recent estimate (1947) is 7,449,000, and of this small total nearly half (3,027,562) live in the five great capitals and seaports of Sydney, Brisbane, Melbourne, Adelaide, and Perth. The remainder of the population is to be found chiefly throughout the hinterland of these towns—areas which experience temperate and Mediterranean types of climate. The monsoon, tropical, and desert lands are very scantily peopled.

1. SYDNEY

This town, the capital of New South Wales, has a population of over a million people. Its importance is due to its fine harbour, productive hinterland, and position near an extensive coal-field. Forty per cent of Australia's trade is handled by Sydney, the chief exports being gold, wool, wheat and flour, butter, meat, and hides; while the

imports are mainly of manufactured goods such as textiles, machinery and cars, petroleum, and tea.

2 BRISBANE

This town, the capital of Queensland, is situated at the head of navigation for ocean-going vessels on the Brisbane river. It handles much of Queensland's trade, which is similar in nature to that of Sydney.

3 MELBOURNE

Melbourne, like Sydney, has over 1,000,000 inhabitants, a good, well-sheltered harbour, and well-developed railway communication inland. The trade handled is similar to that of Sydney, but includes a greater proportion of fruit.

4 ADELAIDE

The capital and chief port of South Australia, depends on an outpost—Port Adelaide, for the handling of its trade.

5. PERTH

In like manner, Perth depends on Fremantle. Both Adelaide and Perth are considerably smaller than the other capitals of Australia.

6 CANBERRA

The capital of the commonwealth. An area of Federal land within New South Wales used solely for Government buildings and the homes of the Officials. The population is 13,000.

I. Trade

The chief trade of Australia lies in the export of raw materials and foodstuffs, and in the import of manufactured articles. Among the exports, wool, with nearly half the total value (1945-46 Great Britain bought £57,835,000 worth) easily leads, after which come wheat and flour, hides and skins, meats, fruits and wine, timber, lead, gold, and silver. The imports are composed chiefly of machinery and textiles. This trade is chiefly with the British Isles, although of recent years the United States and, prior to 1940, Japan have been winning an increasing share in Australian markets.

J. "White Australia"

It has been indicated already that the density of population along the monsoon and tropical northern regions of Australia is very low in spite of the great agricultural possibilities. The difficulty retarding development is to a great extent lack of labour. The national policy of the present century is one of "Australia for the Whites," and immigration of coloured peoples has ceased. This policy has created difficulty in the sugar plantations of Queensland, which depended originally on South Sea Island labourers. Furthermore, development of the northern territories is practically at a standstill. This policy has been the cause of friction between Australia and the overpopulated countries of Asia.

TASMANIA

Tasmania, lying in the belt of westerly winds all the year round, experiences a cool temperate type of climate. The mountains are forested, but the river valleys and coastlands are cultivated. Wheat and barley constitute the chief cereal crops, and fruits are cultivated on a large scale. Apples constitute one of the chief exports.

In the Mount Lyell district, copper, silver, and lead are all produced in considerable quantities, and hydraulic electricity has been developed to assist in smelting the ores.

The capital and chief town is Hobart, while Launceston handles most of Tasmania's trade.

NEW ZEALAND

A. Position

New Zealand proper consists mainly of two large islands which extend roughly from 35° S. to 45° S. This country, then, lies entirely within temperate latitudes. Included within the boundaries of the Dominion of New Zealand are island groups, of which the Cook Islands (20° S. 158° W.) are the most extensive.

B. Physical Features

Much of New Zealand proper, comprising North Island and South Island, consists of mountain chains. In South

Island, the main chain, known as the Southern Alps, runs close to the western coast, leaving extensive plains to the east

In North Island, the mountain chain is more broken, but lies nearer to the east than to the west, and hence the plains lie mainly to the west of the mountains. These western plains include a volcanic region in which occur hot springs and geysers

The rivers are short and swift flowing and are, therefore, of little use for transport, but of great value as a source of power

C Climate

Except for the North Auckland Peninsula, which experiences modified Mediterranean conditions, New Zealand lies within the belt of westerly winds throughout the year, and the westward shores and mountain slopes receive a very heavy annual rainfall. A distinction must here be made between North Island and South Island. In North Island, the rain-bearing winds travel over the western plains before encountering the mountains, and these plains experience a rainfall of over 50 inches annually. In passing over the mountains, much of the moisture is deposited, and the smaller eastern plains have a rainfall of under 30 inches

In South Island, the rain-bearing winds have to cross the mountains before reaching the plains, and as a result the western slopes of the mountains have over 80 inches annually. The sheltered plains to the east, on the other hand, have less than 30 inches

The oceanic position affects also the temperature conditions, and the annual range is small. The considerable range of latitude does not greatly affect temperature. Towards the northern limit of North Island, for example, the range is from 50° F. in July (Southern winter) to 65° F. in December, while towards the southern limit of South Island the same months give a range from 40° F. to 55° F.

The high altitude of much of the interior of the islands affects the temperature conditions, and many of the mountain ranges are snow-capped.

D. Natural Regions and Products

1. THE MOUNTAIN FORESTS

The wetter slopes of the mountains, especially of those in South Island, are densely forested. The chief species are pines, cedars, and yews. The greater part of the forest regions are as yet unoccupied. On the eastern slopes of the mountains are large reserves of beech, and New Zealand is fortunate, therefore, in having large resources of both softwoods and hardwoods.

2. THE WESTERN PLAINLANDS

These are to be found mainly in North Island, and since they experience a heavy rainfall, the grassland is rich and eminently suitable for cattle. This is the great dairying region of New Zealand, and is mainly responsible for the huge export of butter and cheese. The districts of Auckland and Wellington are most important in this connexion, and the towns of Auckland (36° 50' S. 175° 0' E) and Wellington are engaged in the export trade.

3. THE EASTERN PLAINLANDS

Here the rainfall is less than 30 inches, and great stretches of country such as the Otago plateau, the Canterbury plains, and Hawke's Bay have climatic conditions suitable for sheep and arable farming. Oats are grown in the south and wheat towards the north, but the chief interest in these plains lies in the tending of sheep. Wool and mutton are both exported in great quantities from these regions.

4. THE AUCKLAND PENINSULA

The warmer climate—tending towards the Mediterranean type—allows the cultivation here of fruit crops such as oranges, lemons, apples, and the vine. The kauri pine, from the gum of which varnish is made, was originally found here in large quantities, but exploitation of this resource has decreased somewhat in recent years.

E. Mineral Wealth

Many minerals are known to exist, but their distribution is scattered and the yield is small. The most important

(c) Areas which produce sugar, maize, tropical fruits, temperate fruits, wheat, vines, karri, jarrah, kauri pine, beef, dairy produce, mutton, wool.

(f) Areas which produce gold, silver and lead, copper, tin, iron ore, coal.

The position of Brisbane, Rockhampton, Sydney, Melbourne, Adelaide, Perth, Fremantle, and Port Darwin, Auckland, Wellington, Christchurch, Dunedin.

(g) *The main railway lines of Australia.*

EXERCISE 9

(1) Select *two* of the following commodities, and discuss the conditions which render certain areas in Australia or New Zealand suitable for their production—

Wool, wine, wheat, dairy produce.

(2) "Australia could be a great manufacturing country." Discuss this statement.

(3) Illustrate by means of a sketch map the natural regions passed through on a train journey from Cairns in Queensland to Perth. Where would changes have to be made from one train to another?

(4) What do you understand by the term "White Australia"? Give your views on the desirability or otherwise of this policy.

CHAPTER X

NORTH AMERICA

BRITISH territory in North America comprises : Canada, Newfoundland, British Honduras (17.0 N 88 40 W.), Jamaica, the Bahamas (26 0 N. 77 30 W.), the Leeward Islands (17.0 N. 64 0 W.), the Windward Islands (13 30 N. 60 0 W), and Barbados (13.15 N. 59.30 W.)

A Position

NORTH America extends from latitude 8° N to more than 80° N, and it is interesting to notice that the line of longitude 100° W roughly divides this tapering continent into two halves. Examination of the positions of the Tropic of Cancer and the Arctic Circle shows that although North America stretches from tropical regions in the south to Arctic regions in the north, the bulk of the continent occupies a temperate position.

B. Physical Features

The mainland of North America, considered as a unit, can be divided into three main physical divisions, (a) the Rocky Mountain system of the west, (b) the Central Plains, and (c) the Appalachian Mountain system towards the east.

The Rocky Mountain system, which runs throughout the whole length of the continent, is marked by two mountain chains and a series of intermontane plateaux. The western mountain chain is marked in Alaska and Canada by the coast ranges, in the United States by the coast ranges and the Sierra Nevada, and in Mexico by the Western Sierras.

The intermontane plateaux include the Yukon plateau, the Columbia plateau, and the central regions of Washington, Nevada, Arizona, and Mexico. To the east of these plateaux lie the Rocky Mountains proper in Canada and the U S A, and the Eastern Sierras in Mexico.

In this western mountain system are found such rivers as the Yukon (Alaska), the Frazer (British Columbia), the

NORTH AMERICA

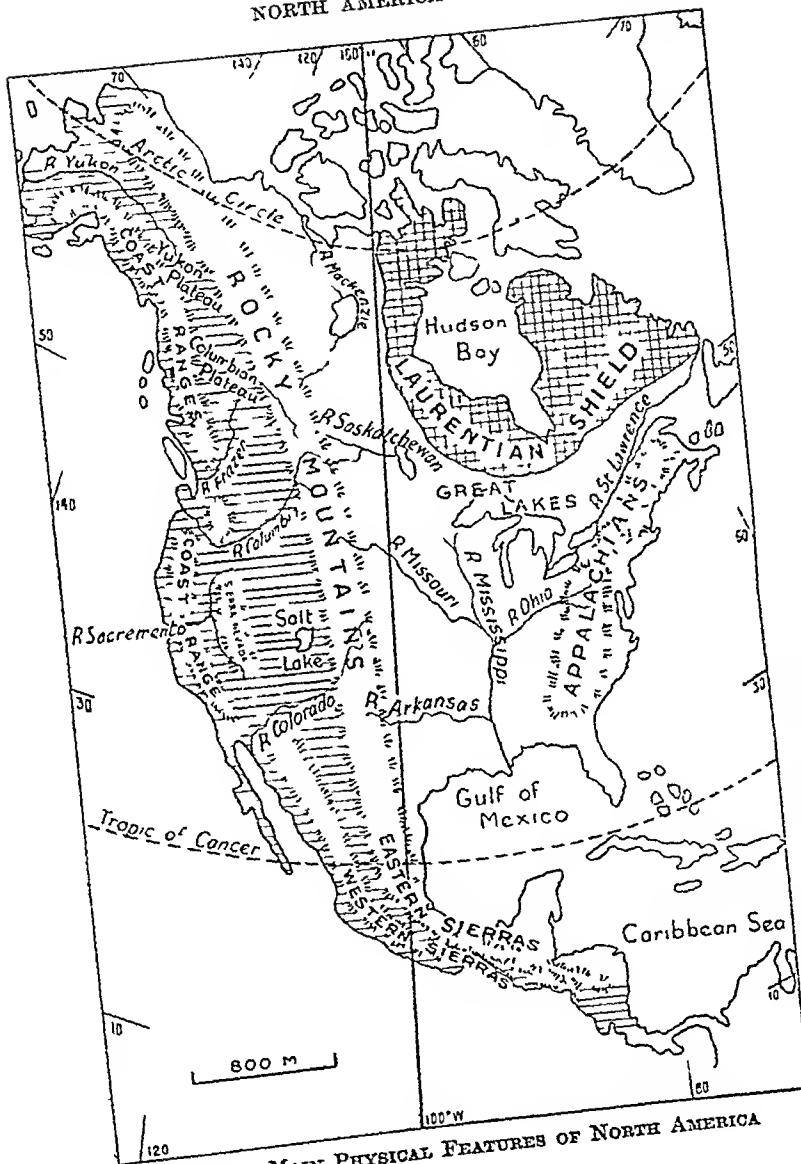


FIG. 67. MAIN PHYSICAL FEATURES OF NORTH AMERICA

Columbia (Washington), the Sacramento (California), and the Colorado. These rivers, flowing as they do through mountainous regions, are navigable only for comparatively short distances from their mouths. The plateau region of Nevada and nearly all Utah comprise an area of inland

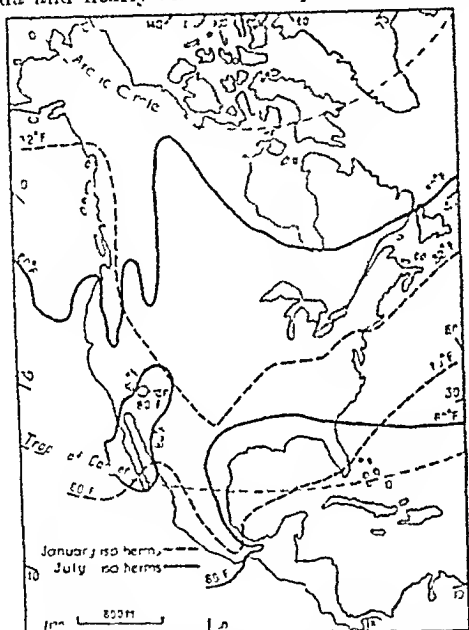


FIG. 68. TEMPERATURE CONDITIONS IN NORTH AMERICA

drainage. Notice the position of the Great Salt Lake (41° 0' N. 112° 30' W.)

The Rocky Mountains descend gradually on the eastern side, and give way first to the uneven country known as the Prairies and eventually to the Central Plains. Around Hudson's Bay the plainland is built up on an old hard rock formation which has been weathered down until it is now saucer-shaped. This is the Laurentian Shield area.

would normally expect from a consideration of its latitude are modified greatly by the extent of the continent and the presence of the great climatic barrier of the Rockies—a barrier which prevents the penetration of winds and mild oceanic conditions from the Pacific into the interior. In

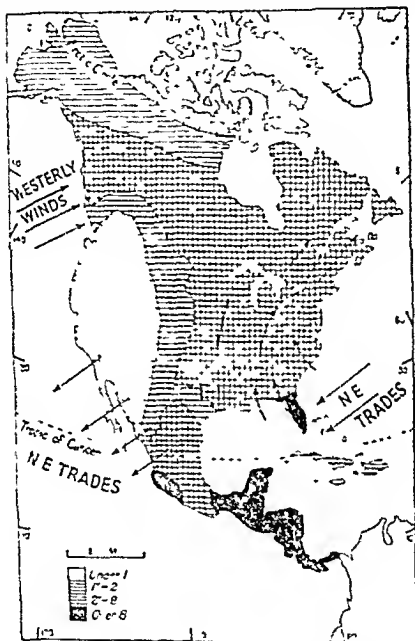


FIG 69B JULY RAINFALL IN NORTH AMERICA

winter the interior of the continent is very cold (cf. Asia), and the lack of penetration of mild modifying winds causes the isotherms to take a well-marked southern curve over the land. In Central Canada the conditions are very cold indeed, Winnipeg, with a January temperature of -7° F., may be quoted as an example.

In summer, on the other hand, the interior is intensely

heated, and the isotherms take a northward sweep. Conditions in the interior of Canada, and to a less degree in the interior of the U.S.A., are continental in character.

On the planetary wind system, the whole of North America to the north of latitude 40° N. would lie within the westerly wind belt, and the remainder would experience trade wind conditions. This is subject to modification as a result of the summer heating of the land masses, a factor which causes inblowing winds and summer rainfall over much of the interior. The east and southern coastlands of the U.S.A., Eastern Mexico, and Central America, on the other hand, experience rain all the year round.

The effect of the westerly winds is restricted by the Rocky Mountain system to a comparatively narrow strip along the western coasts of Canada and North-western U.S.A. These regions have rainfall all the year round, whereas Central California comes under the sway of this wind system only in winter, when the wind belts move south. This last-named region, therefore, experiences winter rain and a Mediterranean type of climate.

D. Natural Regions

These result directly from the climatic conditions. In the extreme north, the low temperatures produce Tundra conditions, which give way in the south to an extensive belt of coniferous woodlands. Elsewhere, the natural vegetation reflects the rainfall conditions. In the regions which experience rain all the year round, forests were originally found, but considerable areas have now been cleared. The summer rainfall of the interior produces temperate grasslands, which give way in the drier west and south-west to coarse grass, scrubs, and eventually to desert.

Central California, with a Mediterranean type of climate, forms a separate climatic region.

E. International Boundaries in North America

Cutting across these natural regions are the international boundaries. That between Canada and the U.S.A. follows

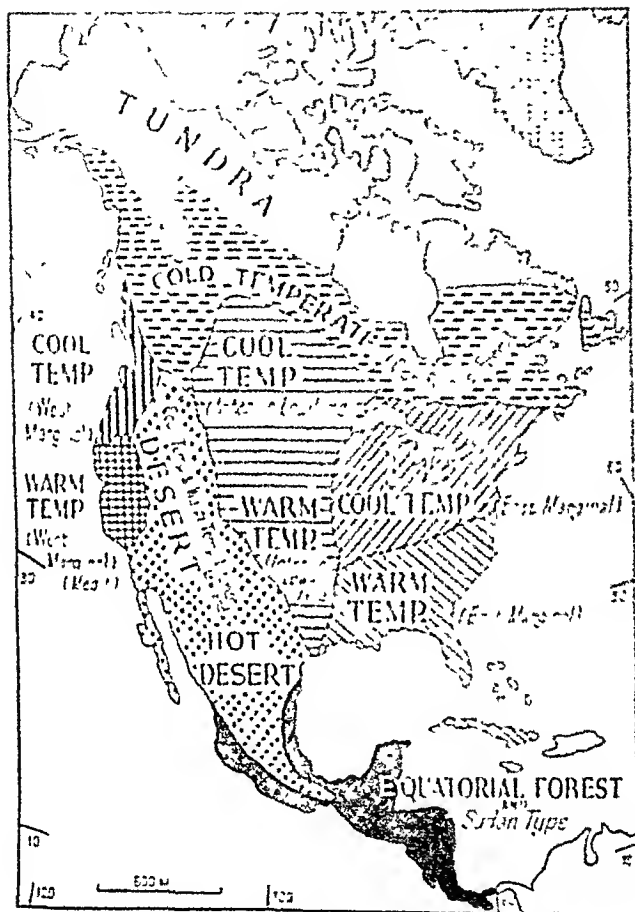


FIG 70 NATURAL REGIONS OF NORTH AMERICA

the line of latitude 49° N., the Great Lakes and Upper St. Lawrence, and then takes an irregular course to the Bay of Fundy.

The boundary between Mexico and the U.S.A. follows the river Rio Grande, and then cuts across country to the Lower Colorado and the Pacific.

CANADA

The area of Canada compares very closely with that of the U.S.A. (including Alaska), or Australia. The natural vegetation map shows, however, that there are large areas almost uninhabitable. At the same time, there are vast areas which are capable of more intensive development, and the present population of 12,300,000 (1946 estimate) is small compared with the possibilities.

A Mineral Wealth

The annual output of mineral wealth has shown a gradual increase throughout the years, and the resources are such that the Dominion of Canada is likely to become one of the leading mineral producers.

In order of value, the chief mineral productions are coal, gold, nickel, lead, copper, silver, and asbestos. The distribution of these minerals (Chapter V) should be revised. Asbestos, of which Canada produces more than four-fifths of the world's total, is found near Quebec.

The mineral power resources of Canada are supplemented by water power development. The chief development has taken place in Eastern Canada, where the rivers from North Quebec and Ontario descend rapidly to the St. Lawrence valley. Water power is also being developed in the Rocky Mountain regions to the west. (See Fig. 71.)

B. Forest Industries

The felling of trees, and the manufacture of lumber and similar saw-mill products, ranks as the third most important human occupation of Canada (agriculture is first and mining second). The woods worked are those from the coniferous forest belt, and of chief importance are the spruce, Douglas

Fir, and white pine. Most development has taken place where the raw material is comparatively easy of access. British Columbia, with over 35 per cent of the total, leads in this respect, and is followed by the eastern States. Across Northern Canada the production of softwood lumber is small.

The development of water power in the eastern States, combined with the presence of softwood timbers, has led

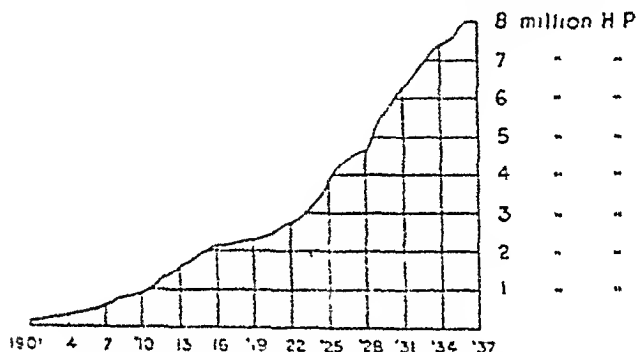


FIG. 71. GROWTH OF HYDRO-ELECTRIC POWER IN CANADA

(The curve shows the total power produced in the Dominion of Canada, and the area under the curve shows the total power consumed.)

to the development of great pulp and paper manufacture. This industry ranks first among Canada's manufacturing industries, and Canada exports more newsprint to the rest of the world combined.

C. Furs

The trapping of fur-bearing animals is one of the oldest of Canada's industries, but great changes have taken place since the early days when it was a major industry. The opening up of the country has driven the animals north, and the aeroplane is now often requisitioned in the transport of pelts. The chief wild animals trapped are the silver fox, muskrat, mink, fox, and beaver. In early days trappers used to keep any foxes caught in the warm weather alive

until the cold season, when the fur was prime. From this has grown up the modern fur farm, of which there are now more than seven thousand in existence. On the farms, the chief animal reared is the silver fox.

D. Agriculture

Over the lowland regions of Eastern Canada, and in the river valleys of British Columbia, the forest has been cleared, and there is also a large area of natural grassland in the interior. All these regions can be developed, and of the 350 million acres available for farming about 250 million acres are at present being worked. In the various regions there is a considerable diversification in the farming activities.

I. EASTERN CANADA

The farming regions here include the St. Lawrence valley of Quebec and Ontario and the lowlands of the Maritime Provinces (New Brunswick, Nova Scotia, and Prince Edward Isle). Mixed farming is general, the chief crops being wheat, oats, hay, barley, and potatoes.

Root and forage crops are grown and fed to cattle, and the dairying industry is highly developed in this area. Fruits are grown, and of chief importance are apples, plums, strawberries and pears. In this connexion the Annapolis valley (44° 5. 65.30 W.) of Nova Scotia and the Niagara Peninsula (46° 0 N. 82° 0 W.) of Ontario are outstanding.

The pig rearing is also important, 70 per cent of Canada's pigs are to be found in the eastern regions.

THE PRAIRIE REGION

Over this area, the temperate grassland of Canada, is given over mainly to extensive farming, and is responsible for more than two-thirds of the field crop cereal production of Canada. Within the triangle marked by Calgary (51° 0 N. 114° 0 W.), Edmonton (53° 40 N. 113° 30 W.), and Winnipeg, most of the land is given over to extensive wheat cultivation. This is a "spring" wheat area, in consequence of the severe winters of the interior. More than 90 per cent of Canada's wheat is grown here, and of this huge

easily occupies the leading position, and is followed by cheese, live stock, potatoes, and apples.

E. Manufactures

The treatment of raw materials and agricultural products, both for home consumption and for export, includes the manufacture of pulp and paper, preparation of animal products, leather manufacture, flour milling, fruit canning and packing, and iron and steel manufacture. The last-named activity is carried on in Nova Scotia (which imports iron ore from Newfoundland and has its own coal supply) and in Ontario

Other industries, which depend largely on imported raw materials, are connected with the manufacture of rubber goods and textiles

Canada is now the second most important manufacturing country in the British Empire. This proud position depends to a very considerable extent on cheap hydro-electric power (see Fig. 71) and varied resources. Many goods which were originally imported are now manufactured at home, and to-day Canada exports many of these goods to all parts of the world. The distribution of the manufacturing activities should be noted in connexion with the following consideration of the main cities.

F. The Main Cities

1. MONTREAL. (See Figs. 41 and 72)

This town, situated on the St. Lawrence at the head of navigation, has the advantage of being at the junction of routes from the sea, the Ottawa valley, the Great Lakes and Central Canada, and the Lake Champlain-River Hudson valleys. This town, then, is superbly situated for collecting timber, grain, flour, and cattle produce for export, and for distributing the imports. The ease with which raw materials can be collected, and the advantage of cheap hydro-electricity, has led to the development of manufactures, the chief of which are connected with iron and steel, machinery, leather, pulp and paper, textiles, sugar refining, and tobacco. As a result of its position and consequent development, Montreal is the largest town in Canada, and has a population of over 1,000,000.

2 QUEBEC

Quebec has lost much of its original importance to Montreal and has a population of only 120,000. It is actively engaged in the export of timber, pulp and paper, and in the manufacture of leather and cotton goods.

3 OTTAWA

This town, the capital of the Dominion, is situated on the Ottawa river. Its chief importance is as an administrative centre, but with its suburb of Hull, Ottawa is engaged in the timber industry.

4 TORONTO (43 40 N. 79 25 W.)

With a population of over 800,000, Toronto is the second largest town. It is situated on the shores of Lake Ontario, and thus can take advantage of the raw materials transported along the Lakes waterway. In addition, Toronto is the chief market for the fertile lake peninsula. Varied industries have grown up, the most important of which are meat and fruit packing, distilling, and the manufacture of textiles, machinery, and motor cars. Hydroelectric power is taken from the Niagara Falls.

5 HALIFAX

Situated in Nova Scotia, Halifax has a deep, well sheltered harbour, good rail communication inland, and, unlike the ports on the St. Lawrence and Hudson Bay, a port free from ice all the year round. Further, coal is easily available from local coal-fields for the fuelling of ships. As an outlet for Canada, especially during the winter season, Halifax is of growing importance. The trade handled is similar to that of Montreal.

6 WINNIPEG

This town owes its development to its position as a collecting centre for the produce of the prairie (see Fig. 40). Railway construction has aided the advance of Winnipeg. Wheat and furs are the chief commodities handled. In the prairie regions other important towns are Regina (50 34 N. 101 40 W.), Saskatoon (52 10 N. 106 38 W.), Calgary, and Edmonton.

7. VANCOUVER

Vancouver, situated on the mainland, is the main outlet for British Columbia and, thanks to railway development, is of growing importance as an outlet for the Western

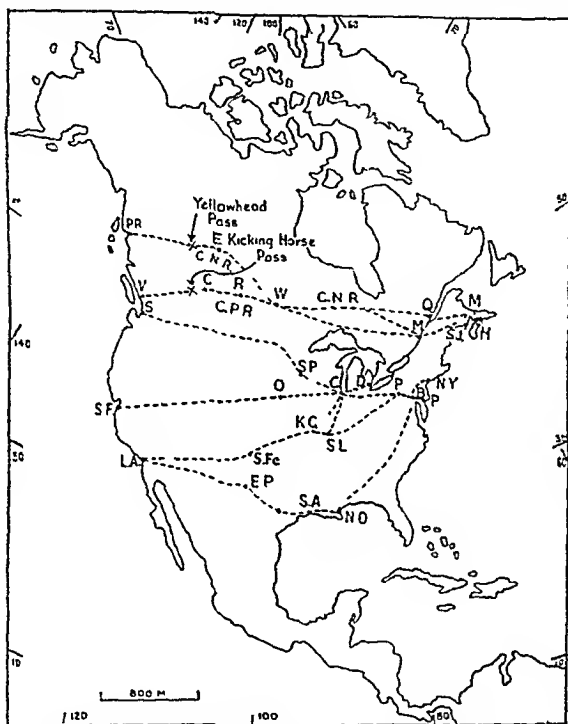


FIG. 72 MAIN TRANS-CONTINENTAL RAILWAY LINES IN NORTH AMERICA

Identify each of the lines and chief towns (indicated by initials)

Prairies. Coal is available for fuelling vessels. Among the exports are timber products, fruit, wheat, and cattle products. On the island of Vancouver stand Victoria and its port of Esquimalt. This port handles coal, the salmon and gold exports of British Columbia, and much of the Alaskan fur trade.

G. Communications

RAILWAYS

The main railways in Canada are the two trans-continental lines running east to west—the Canadian Pacific Railway (C.P.R.) and the Canadian National Railway (C.N.R.). The Canadian Pacific line starts from Halifax and St. John, runs across United States territory to Montreal, ascends the Ottawa river, and then proceeds to Winnipeg. From here the line crosses the plains to Regina and Calgary before breaking through the Rockies by means of the Kicking Horse Pass (51° 15' N. 116° 12' W.). The line then follows the Fraser river to Vancouver.

The Canadian National Railway starts at Moncton (46° 10' N. 65° 0' W.) and runs through Canadian territory to Quebec. From here the line runs to Winnipeg and Edmonton, crosses the Rockies via the Yellowhead Pass (52° 10' N. 117° 15' W.), and descends through river valleys to the Pacific port of Prince Rupert (54° 18' N. 130° 27' W.).

THE GREAT LAKES SYSTEM

Transport from the St. Lawrence via the Great Lakes, was impeded in early days by rapids or waterfalls, of which the famous Niagara Falls are an example. Canals to circumvent these obstacles have been constructed. The Welland Canal joins Lakes Erie and Ontario, and the Soo canals, which carry more tonnage annually than the Panama, join Superior and Huron. The positions on Lake Superior of Port Arthur and Fort William, two important lake ports for the shipment of the Prairie produce eastwards, should be noted.

THE ALASKAN HIGHWAY

Special mention must be made of the Alaskan Highway running from Fort St. George (B.C.) to Fairbanks, Alaska. This road was originally constructed for military purposes but will eventually become a civilian routeway.

H. Trade

Canada's trade is largely with its neighbour, the U.S.A., and with the United Kingdom. Much of the remainder of the trade is with the British territories overseas.

IMPORTS, 1946

VALUE IN CANADIAN DOLLARS

<i>From</i>	
U.K.	201,433,220
U.S A	1,405,296,699

EXPORTS, 1946

VALUE IN CANADIAN DOLLARS

U K	597,506,175
U.S A.	887,940,676
Total Imports 1946	1,927,279,402
Total Exports 1946	2,312,215,301

The chief exports are raw materials and agricultural products such as wheat, woodpulp and newsprint, cheese, meat, furs, apples, fish, and metals, and manufactured articles, such as automobiles and rubber tyres. The imports include coal and petrolcum, chiefly from the United States and Mexico respectively, machinery, and products of warmer climes, such as raw cotton, tobacco, cane sugar, rubber, and tea.

NEWFOUNDLAND

Within Newfoundland is included the mainland region of Labrador. Much of the region is forested with softwood timbers, and the preparation of woodpulp and newsprint is an important industry. The climate is harsh, but in sheltered coastal regions, hay, root crops, and hardy cereals are grown.

Fishing on the famous "banks" is engaged in, and the produce is landed at small fishing settlements for drying and curing. St. Johns (47 37 N. 52 40 W) is the only large port and town, and exports the forest produce and fish. Belle Isle (52 0 N. 55 0 W.), to the north of Newfoundland, has valuable reserves of iron ore

Labrador is wild, rocky, and largely unexploited. The few settlements are mainly along the coast.

THE UNITED STATES

United States possessions in North America include the U.S.A. proper, lying between the boundaries of Canada

and Mexico, Alaska, the Panama Canal, and the West Indies island of Porto Rico (18 15 N 66 25 W.).

The U S A is roughly the same size as Canada, but is much more intensely developed, and supports a population of over 120 million people. There are still, however, considerable regions not fully developed.

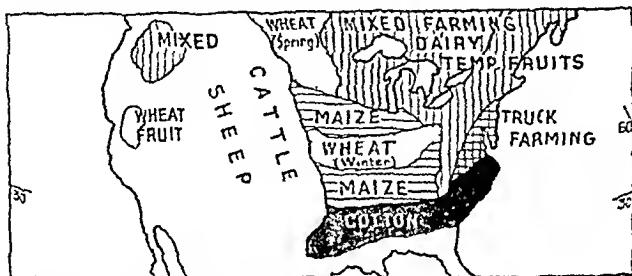


FIG 73 CHIEF AGRICULTURAL DIVISIONS OF THE U S A

A. Mineral Wealth

The U.S.A. occupies a leading place in the production of many of the most important minerals. The distribution of this wealth, which has already been dealt with in Chapter IV, should be revised. Particular attention should be paid to the power resources—coal and petroleum. The development of water-power resources in the U.S.A. is slow, a fact which is mainly due to (a) the position of the possible water power areas in the Rockies, well away from the chief manufacturing areas, and (b) the possession of great power resources in coal and petroleum, which are readily available or easily accessible in the manufacturing areas.

B Forest Industries

While considerable areas have been cleared of forest, there are still large reserves of softwood timbers in the south-east, where Louisiana, Mississippi, and Alabama are the main States concerned, and in the north-western States of Washington and Oregon. In all these States lumbering and the preparation of timber, turpentine, and resin are important.

In North-east U.S.A. and the lake States, softwood timbers are used in the manufacture of pulp and paper, but this supply is insufficient to meet home requirements, and is supplemented by import from Canada.

C. Agriculture

The wide climatic and soil differences throughout the United States cause diversification of crops.

1. WHEAT

This is grown over extensive areas in the Central Plainland region, but the chief concentrations are found in two belts: (a) North and South Dakota, and (b) Ohio, Indiana, Missouri, and Kansas. In the northern belt the more severe winter results in the production of spring wheat, whereas, elsewhere, winter wheat is cultivated. The north-eastern States of the U.S.A. are densely populated, and it is towards these States that most of the plainland wheat moves. That grown in the north moves via the lakes, while that of the southern States depends on railways. Other regions of wheat production are North Washington and California *Hedg. c*

In spite of the large production of wheat in the U.S.A., little is exported.

2. MAIZE

Between the two main wheat belts, and extending southward through the winter wheat belt, is the great maize area. Some of this product is used for human consumption, but much is also used for feeding swine and cattle. The ranch cattle are usually driven to the maize belt for fattening.

3. CATTLE AND SHEEP

Towards the west of the plainland, the climatic conditions are too dry for agriculture, and these prairie regions are given over mainly to cattle ranches and sheep runs. In the dry intermontane plateaux to the west of the Rockies, sheep are also important.

4. MIXED FARMING

Around the lake States, and in New England, mixed farming is the rule. Oats, barley, hay, and root crops are

grown, and the fodder crops are fed to dairy cattle. Fresh milk, condensed milk, cheese, and butter are produced here, and sent to the large industrial towns. Along the eastern coastal plains of the U.S.A. truck farming—the production of vegetables and market garden produce—is an important activity. The produce, or “truck” as it is called, is, like the dairy produce, sent to the large towns for consumption.

5 COTTON

The U.S.A. is the major cotton producer in the world, and this crop is concentrated mainly in the Lower Mississippi States, Texas, Alabama, and Georgia. Much cotton is exported via Galveston (29 15 N 95 0 W.) and New Orleans (30 0 N 90 0 W.)

6 TOBACCO

This crop is grown in the Appalachian region, especially in the States of Virginia, North Carolina, and South Carolina.

7 FRUIT

Temperate fruits, such as apples and grapes, are widely grown near the lakes and in New York State, while citrus fruits, such as oranges, lemons, and grape-fruit, are produced in Florida and California. This latter State, with its Mediterranean type of climate, has specialized in fruit production, and the packing and canning of the produce has become the leading industry. In addition to the fruits already mentioned, California grows and exports apricots, peaches, pears, and “truck.”

The agricultural produce of the U.S.A. is very diverse, and the region could be almost self-supporting. The crops not grown are those of tropical and equatorial lands, such as rubber, tea, coffee, and bananas.

D Industry

Industrial activity in the United States is very highly developed. This is the result of the vast resources of mineral wealth, power, and agricultural raw materials, combined with the huge home market.

1. PREPARATION OF FOOD FOR MARKETS

Flour milling and the preparation of maize for human consumption are carried on in many of the towns in the Central Plainland Minneapolis (45 0 N. 93 30 W.), St Paul, St. Louis (38.40 N. 93 30 W.), and Kansas City (39 0 N 94.30 W.) are the chief towns so engaged, while Chicago is engaged both in flour milling and in the slaughtering and packing of meat The fruit canning industry of California is important, and here the chief towns of note are Sacramento (38 30 N. 121 30 W) and San Francisco.

2 TEXTILE INDUSTRIES

Cotton manufacture is carried on mainly in the north-eastern cities, where Fall River (41 34 N 71.0 W.), Manchester (43 0 N. 71 35 W.), and Providence (41.42 N. 71.23 W.) are noteworthy examples The industry grew up on the basis of running water, moist climate, and adjacent markets To-day coal from Pennsylvania and hydro-electric power from the mountain streams are the chief sources of power. The raw cotton is imported from Southern U.S A.

In the cotton-growing area itself, cotton manufacture has sprung up, and Birmingham is here the centre of the industry, for which the coal of the Southern Appalachian field is used

The north-eastern cities, especially Boston and Philadelphia, are also the chief centres of woollen manufacture. Philadelphia, Baltimore, Boston, New York, and the smaller neighbouring cities, especially Paterson, lead in the manufacture of ready-made clothing and silk.

3. IRON AND STEEL: MACHINERY, MOTOR CARS

The main iron and steel centres have developed in conjunction with the coal of Pennsylvania and the iron ore deposits to the west of Lake Superior. The iron ore is shipped at Duluth (47 0 N. 92 20 W.) and Superior (46 40 N. 92 0 W.), and moves eastward down the lakes to Cleveland (41.25 N. 81.40 W.) and Erie (42 0 N. 80 30 W) from which it is taken overland to Pittsburgh. Coal moves in the

3. PHILADELPHIA

Philadelphia possesses a good harbour and has access by means of the Susquehanna valley to Pennsylvania and the interior. Coal, iron and steel products, heavy machinery, and oil from the Pittsburgh area rank as the leading exports. The manufacture of textiles, especially woollen goods, shipbuilding, and ship repairs, are all important industries.

4. CHICAGO

This town, on the shore of Lake Michigan, is ideally situated as a collecting and distributing centre for the central plains and prairies. Railway lines from the north-west bend south to circumvent the lakes, and in so doing make Chicago a focal point, while there are also many excellent rail communications with the rest of the U.S.A. Further, its position on the lakes makes this town an important port for shipment of goods eastwards via the Lakes waterway, and for receipt of goods travelling in the opposite direction.

As a result, Chicago is the chief grain, cattle, and pork market in Central U.S.A. Apart from the preparation of agricultural produce for market, the ease with which raw materials can be collected, and its excellent position for the distribution of manufactured articles throughout the plains, have led to such industries in Chicago as the making of agricultural machinery, railway equipment, and leather products.

5. SAN FRANCISCO

This town handles the fruit and wheat exports of California, and is also a port of call and coaling station for transpacific shipping.

F. Communications

1. WATERWAYS

The value of the Great Lakes system has already been indicated. The construction of the Erie Canal has made possible the transport by water of produce from the central plains to the Hudson and New York. The chief commodities

moving eastwards are iron ore, wheat, and meat products, while in the opposite direction move coal and manufactured articles

The Mississippi system, which comprises the Mississippi itself, the Ohio, and the Missouri, is used for carrying cotton, maize, and timber from the interior to New Orleans for export. The smaller rivers of the U.S.A., such as the Columbia, Sacramento, and Potomac, are navigable in their lower courses, and are used for transport of heavy goods

2 RAILWAYS (See Fig 72)

To the east of the line of longitude 100° W, the U.S.A. is covered by a close network of railways, a factor which shows the higher development of the eastern half, as compared with the western. The gauge is standard throughout, and allows of the linking up of the main lines

There are three main trans-continental lines. The first starts from New York, follows the Hudson-Mohawk route to Buffalo, and then skirts the lakes to Chicago. At Chicago the line divides, one branch runs north-westward to St. Paul and across the Rockies to Seattle ($48^{\circ} 0' \text{ N } 122^{\circ} 20' \text{ W}$), while the other continues due west to Omaha ($41^{\circ} 30' \text{ N } 96^{\circ} 12' \text{ W}$) and San Francisco. Chicago, the great focal point, also has important rail connections with Pittsburgh, Winnipeg, Detroit, Toronto and Montreal, Kansas City, and St. Louis

The second trans-continental line starts from Philadelphia and runs via Baltimore and the Potomac valley to St. Louis, and thence to Kansas City, Santa Fé, and Los Angeles ($34^{\circ} 0' \text{ N } 118^{\circ} 12' \text{ W}$)

Lastly, there is the more southerly line, which starts from Baltimore and follows the Eastern Appalachians to New Orleans. From New Orleans, the line runs to San Antonio ($29^{\circ} 30' \text{ N } 98^{\circ} 22' \text{ W}$), El Paso ($32^{\circ} 0' \text{ N } 106^{\circ} 30' \text{ W}$), and Los Angeles

3 AIRWAYS

America is the largest internal airline operating country in the world and has an air service organization covering the world

G. Trade of U.S.A.

The great extent of the country, together with the diverse nature of the productions, causes a great amount of internal trade, and, compared with this, the external trade is small. Both raw materials and manufactured goods, such as raw cotton, oil, machinery, tobacco, and fruits, are exported, while the chief imports are mainly of tropical commodities, such as coffee, cane sugar, and raw silk. From Canada, the U.S.A. imports much softwood pulp and paper.

Among the leading countries with which U.S.A. trades are Canada, Great Britain, France, Germany, Japan, the Philippine Islands, and the republics of Central America and Cuba. The chief ports dealing with this overseas traffic are New York, Philadelphia, Boston, Baltimore, New Orleans, and San Francisco.

MEXICO

This republic is wealthy in natural resources, but is not fully developed. This latter fact is largely due to the instability of the governments. Much of the country consists of a high central plateau, flanked by the Sierras to east and west. The coastal plains are narrow.

The mineral wealth is great, and the plateau region of Mexico produces large quantities of silver, gold, and copper. Along the east coastal plains are extensive oil-fields, the produce of which is exported from Tampico and Tuxpan (20 50 N. 97 23 W.).

The coastlands experience heavy well-distributed rainfall, but inland and on the plateau the amount of rainfall decreases with distance from the sea, and eventually gives way to desert conditions.

The tropical climate of the coastlands allows the production of crops such as cane sugar, rubber, and sisal hemp. On the hill-slopes good crops of coffee and maize are produced, whereas, on the dry plateau, much of the land is given over to sheep runs and cattle ranches. In certain regions, especially round Mexico City (19.25 N. 99.0 W.) and Torreon (26 0 N. 103 30 W.), irrigation is practised, and cotton and wheat are cultivated.

The trade of Mexico consists largely of the export of silver, gold, petroleum, sisal, coffee, and cotton. Most of the imports are textile manufactures. Apart from the export of oil, most of the trade of Mexico is handled by Vera Cruz.

THE WEST INDIES

These islands lie within the Tropics, and are thus capable of producing many commodities required by the great industrial countries, most of which lie in temperate regions.

Cuba. Although a republic, Cuba has been developed by the U.S.A., and now exports to that country considerable quantities of cane sugar and tropical fruits. Tobacco is, after sugar, the chief product, and is made into cigars at Havana, the chief port.

Jamaica, a British possession, is chiefly noted for its production of cane sugar and bananas, which are exported to Great Britain and the U.S.A., via the ports of Kingston and Port Antonio.

Hispaniola, Porto Rico, and the Lesser Antilles are less fully developed, and export only small quantities of sugar, tobacco, and coffee.

ATLAS STUDY AND REVISION

Make sure that you can mark, accurately, on a blank map of North America, any of the following—

- (a) The Tropic of Cancer and the Arctic Circle.
- (b) Hudson Bay, Gulf of St. Lawrence, Gulf of Mexico, Caribbean Sea, and the Gulf of California.
- (c) The boundaries between Canada, U.S.A., and Mexico; the position of Newfoundland, Labrador, Alaska, Cuba, Jamaica, and the Bahamas.
- (d) The Rockies, West Coast ranges and Sierra Nevada, Appalachians, and Laurentian Shield.
- (e) The rivers Yukon, Columbia, Sacramento, Colorado, Mississippi and its tributaries, the Missouri and Ohio, Susquehanna, Potomac, Hudson-Mohawk, and the St. Lawrence. The Great Lakes (Superior, Michigan, Huron, Erie, and Ontario), Soo, Welland and Erie Canals, Niagara Falls, and the Great Salt Lake.
- (f) The January isotherm of 32° F. and the July isotherm of 60° F., the position of the westerly wind belt and trade wind belt. Areas which have (i) rain all the year round, (ii) mainly summer rain, (iii) mainly winter rain, and (iv) little rain throughout the year.
- (g) The natural regions.

(2) Areas which produce coal, iron ore, petroleum, and the main regions of hydro-electric development.

(i) Chief areas producing timber, turpentine, pulp and paper, furs, temperate fruits, Mediterranean fruits, tropical fruits, wheat, maize, cotton, tobacco, sugar, bananas, dairy produce, truck, and salmon.

(j) The main areas given over to (i) sheep, (ii) beef cattle, and (iii) mixed farming.

(k) The Canadian Pacific Railway, Canadian National Railway, and the trans-continental lines of the U.S.A.

(l) The position of St. John's (Newfoundland), St. John (Maritime Provinces), Halifax, Quebec, Montreal, Ottawa, Toronto, Fort William, Port Arthur, Winnipeg, Calgary, Edmonton, Vancouver, Victoria, and Port Arthur.

(m) The position of Boston, New York, Philadelphia, Baltimore, Buffalo, Cleveland, Pittsburgh, Chicago, Duluth, Minneapolis, St. Paul, St. Louis, Kansas City, Birmingham, New Orleans, Seattle, San Francisco, and Los Angeles.

(n) The position of Mexico City, Vera Cruz, Tampico, Turpin, the Panama Canal, Havana, and Kingston.

EXERCISE 10

(1) Write short notes on the following Canadian industries—

(a) Forestry, (b) fur trapping, (c) manufactures

(2) For *three* of the following commodities, give regions in North America where they are produced in large quantities, discuss briefly the factors involved in their production, and explain by which routes they reach the coast for export—

Wheat, beef, cotton, fruit.

(3) Describe a journey across Canada by the C.P.R. line (Note: physical features, natural regions, human activities, chief towns.)

(4) Describe, and illustrate by means of sketch maps, the positions and activities of three of the following towns—

Montreal, Toronto, Winnipeg, Vancouver, New York, Chicago.

(5) The area immediately to the south of the Great Lakes is densely peopled, while that to the south of Hudson Bay is scantily peopled. Give reasons for this distribution.

CHAPTER XI

SOUTH AMERICA

BRITISH Empire possessions in South America include Trinidad (10 30 N. 61.20 W), British Guiana, and the Falkland Islands (52 0 S. 60 0 W.) off the coast of Argentina.

A. Position

SOUTH America, the fourth largest of the continents, extends roughly from 12° N to 56° S. The tapering shape results in the fact that the greater part of the continent lies within tropical latitudes. The positions of the Equator, the Tropic of Capricorn, and the line of latitude 40° S should be noted.

B Physical Features

As in North America, the chief mountain ranges are found on the west. Throughout the whole length of the continent in South America run the lofty Andes, often snow-capped in spite of the low latitudes. Within the mountain ranges are found plateaux, such as that comprising much of Bolivia and South-eastern Peru.

In Bolivia is Lake Titicaca (16 0 S. 69 20 W), a centre of inland drainage.

Apart from Southern Chile, where the mountains meet the sea and produce a rocky, isle-studded coast, the area to the west of the Andes is marked by a narrow coastal plain. In the north, the river Magdalena runs parallel with the mountain chains, and gives rise to a fairly wide valley before opening out into a comparatively extensive plain in its lower course.

Towards the east, the Andes give way to three large central plains. (a) the basin of the Orinoco in the north, (b) the Amazon basin, and (c) the Paraguay-Parana basin and Argentine lowlands towards the south. Apart from the Magdalena already referred to, these basins contain the great rivers of South America. South of latitude 40° S,

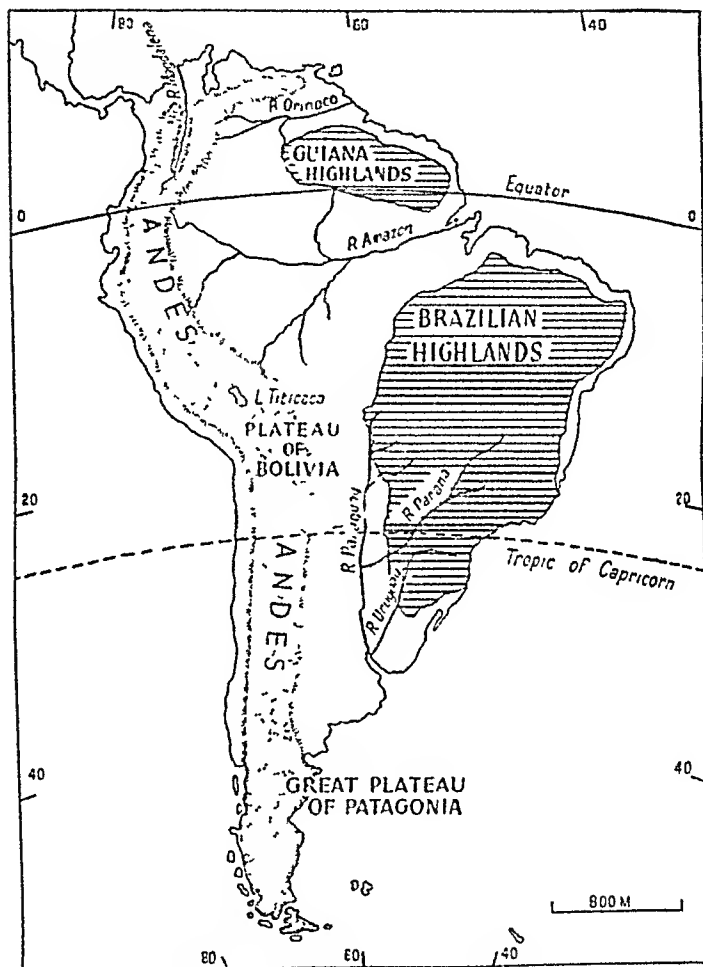


FIG. 74. CHIEF PHYSICAL FEATURES OF SOUTH AMERICA

the region east of the Andes is marked by the plateau of Patagonia

Elsewhere, i.e. in Eastern Venezuela, the Guianas and Eastern Brazil, are found the eastern highlands and plateaux

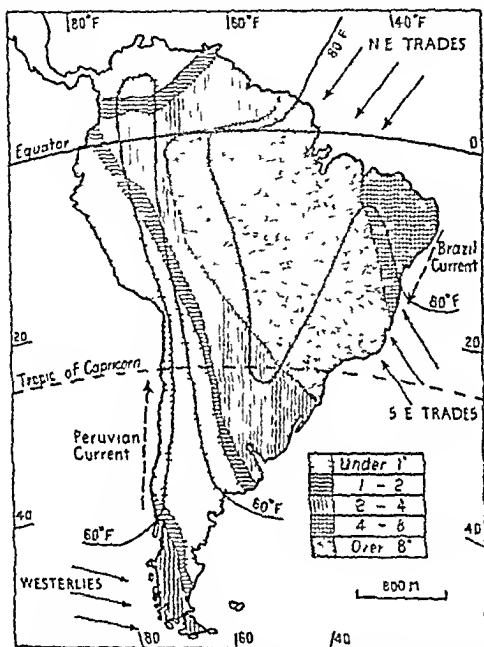


FIG. 75A CLIMATIC CONDITIONS OF SOUTH AMERICA IN JANUARY

(Winter in Northern Hemisphere, summer in Southern Hemisphere)

known respectively as the Guiana highlands and Brazilian highlands.

C. Climate

Over much of South America the climatic conditions compare closely with those of Africa. In the southern

summer, the sun is overhead to the south of the Equator, and much of the interior here has average temperatures of over 80° F. These conditions are shown by the January isotherms in Fig. 75A, in connexion with which the effect of

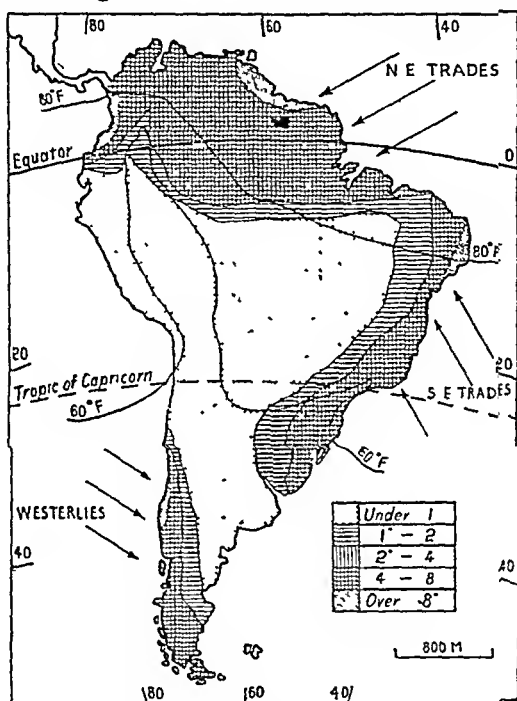


FIG 75B. CLIMATIC CONDITIONS OF SOUTH AMERICA IN JULY

altitude should be noted. During the opposite season of the year, the sun has moved northward and the chief centres of heat are now in the Orinoco and North Amazon basins. It is interesting and instructive to note that, apart from the Andes, regions north of the tropic experience a small annual range—generally less than 5° F.—and a temperature above 70° F. throughout the year. Further, differences result from the ocean currents which bathe

the shores Along the west coast, as far south as Valparaiso, the cold Peruvian current is in evidence and causes lowering of temperatures, while the opposite coast is bathed by the warm Brazilian current and higher temperatures result

As with the Rockies in North America, so again with the Andes, the chain of mountains provides an effective barrier to the main winds In the central Amazon valley convectional rainfall of true equatorial type is experienced throughout the year, while tropical areas slightly to north and south of this belt experience heavy rainfall during their respective summer seasons. The prevalent winds are the North-east and South-east Trades, and these help to reinforce the equatorial convectional rainfall When the sun is overhead north of the Equator, the hot interior causes the North-east Trades to be more powerful, and thus there is here a well-marked summer rainfall. South of the Equator the reinforcement of the South-east Trades during the southern hot season causes summer rainfall. This effect is felt as far south as Southern Argentina. So effective are the Andes as a barrier that much of the coastal plainland and the mountain interior experiences very dry conditions throughout the year Further, the summer rainfall of the Parana-Paraguay basin and Argentina decreases with distance inland, and near the East Andean foothills of these regions desert conditions are found.

To the south of latitude 40° S, South America lies in the westerly wind belt, and, as a result, the coast and mountains of Southern Chile experience a heavy rainfall throughout the year. The Andes prevent penetration of this moisture inland, and much of Patagonia experiences less than 10 inches annually.

Movement of the wind belts northward during the southern winter brings Central Chile within the region of the Westerlies, from which results winter rainfall and a Mediterranean type of climate

D Natural Regions

1. THE ANDES

The Andean region introduces a complication into the division of South America, for, at different elevations, is

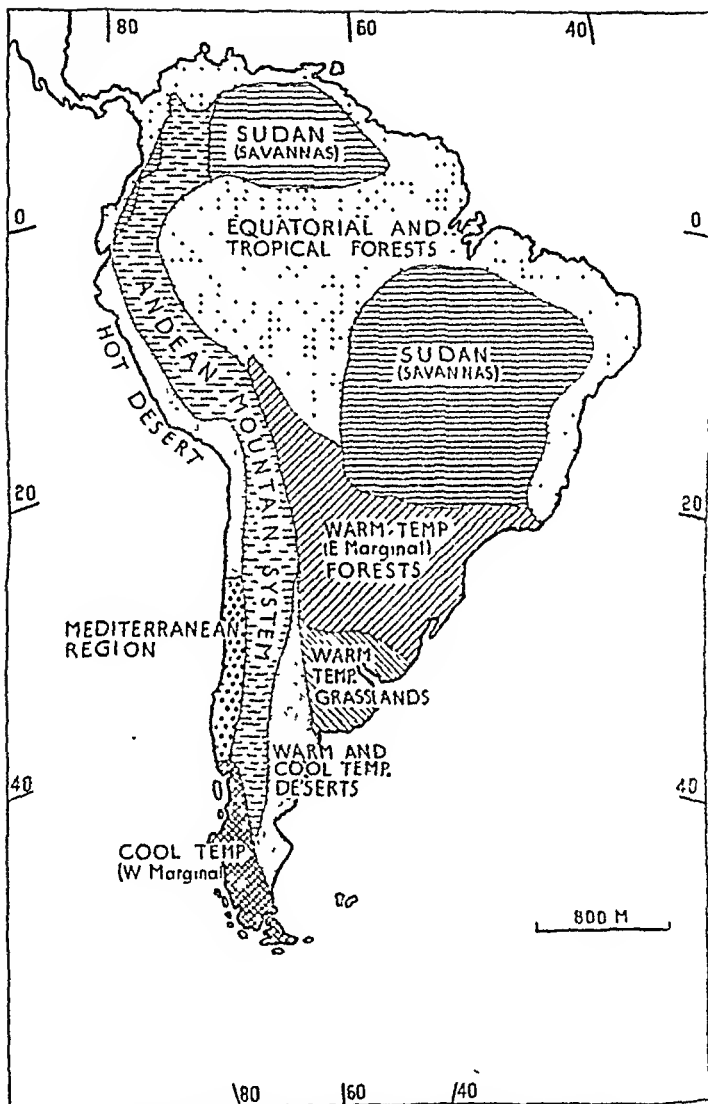


FIG. 76. NATURAL REGIONS OF SOUTH AMERICA

exhibited every variety of climate and vegetation, from tropical to Arctic

Towards the north, in *Northern Ecuador, Colombia, and Western Venezuela*, the lower Andes and river valleys, of which the Magdalena is the most important, are clothed with tropical forests. Where the land is cleared a great variety of crops can be grown. In the lowlands, cocoa, bananas, and sugar are of chief importance, while on the lower slopes of the mountains maize and coffee are produced.

The mineral wealth of this region is important, for there are considerable resources of petroleum in the Magdalena valley and in the lowlands round the Gulf of Maracaibo (11 30 N 71 0 W). The export trade of this northern region, handled mainly by Barranquilla (11 0 N 74 45 W) and Maracaibo, consists chiefly of cocoa and oil, whereas Guayaquil (2 0 S 80 0 W), in Ecuador, exports cocoa and "Panama" hats.

The Andean region of Southern Ecuador, Peru, and Bolivia is more noted for its mineral wealth than for its agricultural produce. This wealth is extensive, and has not been fully exploited, but there is a considerable export of copper and silver from Peru, and tin and silver from Bolivia. This produce is exported from the Peruvian ports of Callao and Mollendo (17 0 S 72 0 W.), and from the North Chilean port of Arica (18.25 S 70 10 W.). The railway line from La Paz (16 30 S. 67 30 W.), the chief town of Bolivia, to Arica, is important in this connexion.

It is interesting to note that in these highland regions, and especially those of Peru, the llama is greatly used for transport. The wool from this animal, together with that of the alpaca, forms a valuable export.

The western slopes of the mountains and the coastal plain, unlike those of the Northern Andean region, experience desert conditions. In the many small river valleys of Peru, however, irrigation is practised, and considerable crops of sugar, maize, and cotton are produced.

The extension of this desert southwards includes the Atacama desert of North Chile, in which are found deposits of nitrates of soda. These nitrates are in great demand

as manures in temperate agricultural regions, and large quantities are exported via the Chilean ports of Arica and Iquique (20 22 S 70.0 W.). Other minerals exported from Northern Chile are copper and silver.

Elsewhere, the Andes are of little economic value. In Southern Chile they are clothed with heavy deciduous forests, but little exploitation has taken place. The population of Southern Chile is scanty and is supported mainly by fishing activities off the coast. The area round Punta Arenas (53 0 S 71 0 W) supports sheep, and is also a gold-mining region.

2. THE MEDITERRANEAN REGION (CENTRAL CHILE)

Central Chile, lying roughly between Coquimbo (30.0 S 71.20 W) in the North and Valdivia in the south, experiences a Mediterranean type of climate and is fortunate in possessing considerable areas of plainland and valleys between the mountain ranges. The usual Mediterranean crops, such as wheat, barley, vines, and citrus fruits are all grown, often under irrigation. Some of this agricultural produce is sent to support the population of the mining regions of North Chile. On the hill-slopes the tending of cattle and sheep are more important than arable farming. Central Chile is one of the few progressive regions of South America, and is more densely peopled than much of the remainder of the continent. While this area is still mainly agricultural, industries are beginning to develop. To this end, power is available in the form of hydraulic electricity produced from the mountain streams and in the form of coal from the area round Concepcion in the south. Industry, which consists largely of brewing, tanning, and textile works, is confined mainly to the towns of Valparaiso and Santiago (33 20 S. 70 25 W.).

In spite of the growing development of manufactures in Chile, the foreign trade still consists mainly of the exchange of raw materials for manufactured goods. Into the former category come nitrates, copper, and silver from North Chile, and wheat, hides, wool, and wines from Central Chile; while the imports include textile manufactures, agricultural and mining machinery, and motor cars. It follows naturally

that Chile's foreign trade is largely with highly industrialized countries such as the United States, and the British Isles via the Panama Canal.

3 THE EQUATORIAL AND TROPICAL FORESTS

The equatorial forest proper, which extends through the Amazon basin and coastlands, is still largely unexplored, undeveloped, and sparsely peopled. The forest vegetation, which is known as the selvas, consists of hardwood trees and a dense impenetrable jungle. The Amazon and its tributaries provide the only means of communication inland, and it is by means of this system of waterways that forest products can be brought down to the sea for export. At one time much of the world's rubber was obtained from the Amazon forests, but with the establishment of plantations in Malaya and the East Indies, the importance of this wild rubber has decreased. In recent years, however, small plantations have been established in this region, centring on Manaus (3° 0' S. 60° 0' W.), to which the Amazon is navigable by ocean vessels, and Para (1° 50' S. 48° 50' W.) on the coast, are the chief centres for collection and export of the raw rubber.

The forests towards the west and south produce cinchona, from which quinine is obtained, while on the southern fringes of the forest Brazilian nuts are collected.

Along the coastlands of the Guianas and the rest of Brazil, the tropical forests have been cleared over considerable areas, and these regions produce many crops. In the lowlands, the chief productions are of manioc, a grain which is used mainly for home consumption, sugar cane (including demerara sugar from British Guiana), cocoa, and cotton. Towards the hill-slopes maize becomes of more importance, while this region includes, behind Sao Paulo and Rio de Janeiro, the greatest coffee-producing area in the world. This agricultural development has resulted in a concentration of population along the eastern coastlands. The trade of the whole region, which is handled by Georgetown (6° 40' N. 58° 15' W.), Pernambuco, Bahia (12° 12' S. 38° 30' W.), and Rio de Janeiro consists of the export of raw materials in exchange for manufactured articles.

Trinidad, a British island lying near the Orinoco mouth, exports cocoa and petroleum.

4. THE SAVANNAS

The tropical grassland covers most of the Orinoco lowlands, where it is known as Llanos; the Guiana Highlands; and the Highlands of Brazil

In the wetter margins of the Llanos, crops of sugar and cocoa are produced, but elsewhere throughout the savanna lands, the conditions are more suited to cattle ranching than to arable farming

The number of cattle actually kept is small, however, and the opening up of the country by means of railways would help to make these areas more productive than at present.

The highlands of the Guianas and Brazil are important for their production of valuable minerals such as gold and diamonds. The chief area of production in Brazil is the State of Minas Geracs (18 30 S. 45 0 W.), while this country is also believed to have great, almost untouched, resources of iron ore, as well as a certain amount of poor grade coal

5. THE WARM TEMPERATE (EAST MARGINAL)

This covers much of South-western Brazil, Paraguay, and Northern Argentina. On the margins of the grassland in Paraguay, cattle are kept, but throughout much of the warm temperate forest areas the scanty population is supported by the collection of forest products. The chief of these products are quebracho, from which tannin is prepared, and Yerba Maté, a native tea, obtained by the preparation of the leaves of a shrub.

6. THE TEMPERATE GRASSLAND

This natural region which is known as the Pampas, covers Uruguay, and much of Eastern Argentina. South and west of a line joining Bahia Blanca and Cordoba (31.30 S. 64 0 W.), this region gives way to temperate desert conditions, while towards the north of Cordoba and Santa Fé (32 0 S. 60 30 W.) the warm temperate forest is in evidence. Throughout the region the rainfall decreases from east to west, a factor which is reflected in the agricultural activities

In Uruguay, the annual rainfall is generally more than 40 inches, and the thick luscious grassland which results is eminently suited for cattle. The keeping of cattle is an activity shared by Eastern Argentina, but the greatest concentration is found in Uruguay. The high rainfall of this state also makes important the cultivation of maize and flax.

Towards the west of the cattle regions of Argentina, the drier conditions make the cultivation of wheat and the tending of sheep the primary activities.

In the west and north-west of Argentina, irrigation is practised, especially around Mendoza (32° 40' S. 68° 40' W.), Tucuman (27° 0' S. 65° 30' W.), and Jujuy (24° 0' S. 66° 0' W.), and sugar cane, vines, and Mediterranean fruits are grown.

The production and preparation for market of these agricultural commodities—cattle, wheat, and sheep—has made the regions of Argentina and Uruguay more densely populated than much of the rest of South America. These areas are covered by a network of railways (very unusual in this continent), which convey the produce of the interior to the main ports, for the bulk of this produce is exported.

In early days, the cattle products could reach overseas markets only in the form of meat extracts, wool, hides and skins, and tallow, and while the preparation and export of these productions are still important, Uruguay and Argentina now also export butter, chilled and frozen beef, frozen mutton and lamb. In addition wheat, linseed (a flax product), and maize are exported in vast quantities.

The chief towns of these temperate grasslands are the large ports, which receive the produce of the interior and prepare it for market. In Uruguay, Montevideo is especially to be noted, while in Argentina, the chief ports are Buenos Aires, Bahia Blanca, Rosario, and the town of La Plata (35° 20' S. 58° 0' W.). Notice the way in which the lines branch out fan-like, from these ports (*N.B.* The estuary of the Parana-Uruguay rivers is often also referred to as La Plata or the Rio de la Plata.)

As with the rest of South America, the chief imports into this area are machinery and textiles.

7. THE TEMPERATE DESERT

Over most of this region, which covers parts of Western Argentina and the whole of Patagonia to the south, little

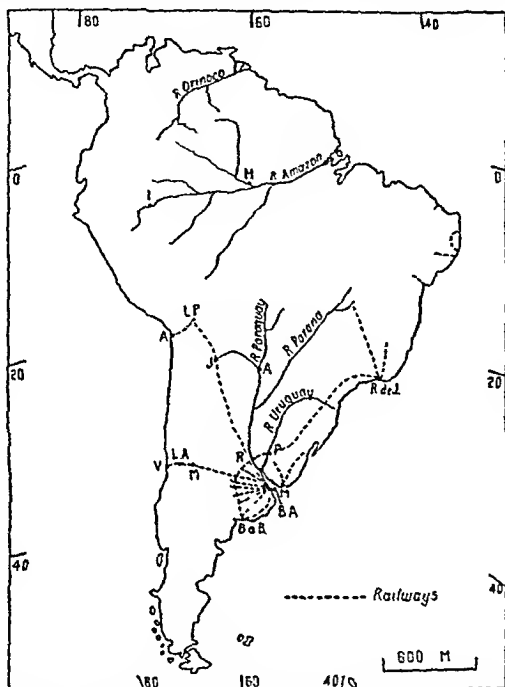


FIG 77. CHIEF COMMUNICATIONS OF SOUTH AMERICA
Identify the trans-continental railway lines and the main towns, which are here indicated by initials

can be grown without the aid of irrigation. Sheep are kept in Patagonia, but the population is scanty.

E. Communications in South America

1. WATERWAYS

The Amazon is the greatest waterway from the point of view of navigability, for vessels can penetrate easily to Manaus and often to Iquitos ($4^{\circ} 0' S. 73^{\circ} 20' W$), under the

lee of the Andes. Unfortunately this magnificent route is of little real value owing to the undeveloped state of the territory through which it passes. In this respect it is similar to the Orinoco, which also is navigable for a considerable distance inland.

Of far more importance are the Uruguay and the Parana-Paraguay system, for these rivers run through highly productive regions, and help the railways to convey produce to and from the ports. The navigability of the Parana has made Rosario a busy seaport, while large steamers can also reach Asuncion on the Paraguay and Paysandu (32° 30' S. 58° 0' W.) on the Uruguay.

2 RAILWAYS

Chile, Eastern Argentina, and Uruguay are the only States which possess good rail communications. Throughout the continent railway-building has resulted in the establishment of isolated lines which act as feeders to the main ports, and is thus very similar to that of Australia. A further similarity exists in the fact that there is no uniform gauge.

The chief trans-continental line at present is that joining Buenos Aires and Valparaiso. The crossing of the Andean chain is difficult and there are breaks of gauge at Mendoza and Los Andes (33° 0' S. 71° 0' W.). This line is used mainly by passengers and mails. Another trans-continental line is that from Buenos Aires to Arica and Mollendo, serving, *en route*, the towns of Rosario, Jujuy, and La Paz.

F. Difficulties of Development in South America

South America has great potentialities, for she has large areas capable of producing equatorial, tropical, and temperate crops, and possesses also considerable mineral wealth. In spite of this, much of South America is still undeveloped, and the population, except that of Central Chile, the temperate grasslands and the coasts of Brazil, is very scanty. Even these regions should be capable of supporting more people than at present.

The chief obstacles to progress at present are the difficulties of clearing the tropical forest, the lack of interest shown by the native population, and the lack of good

communications. The native Indian, whose ability to withstand the climate could make him of great assistance to the European in developing South America, much prefers to lead his own life and exist on the crops he collects or produces himself, and it seems that this labour difficulty can only be solved by the Mestizos (half castes).

The development of large-scale railway communication is hindered by the Andes and Eastern mountains, together with the difficulty of clearing much of the equatorial and tropical forests. Further, for railway construction, money is needed, and capital must be borrowed from such countries as the U S A and Great Britain. The instability of the governments of many of the South American countries makes the lending of money a great financial risk, and financiers have become rather chary about advancing money. The development of stable political conditions may, in course of time, result in the influx of capital into South America, and help that continent to develop as one of the great producers of the world.

ATLAS STUDY AND REVISION

Make sure that you can mark, accurately, on a blank map of South America, any of the following—

- (a) The Equator, Tropic of Capricorn, latitude 40° S.
- (b) The Andes, Bolivian plateau, Patagonian plateau, Guayana, and Brazilian Highlands
- (c) The rivers Amazon, Orinoco, Magdalena, Parana, Paraguay, and Uruguay, Lake Titicaca and the Gulf of Maracaibo.
- (d) The regions affected by (i) North-east Trades, (ii) South-east Trades, (iii) westerly winds.
- (e) Areas which experience (i) rain all the year, (ii) mainly summer rain, (iii) mainly winter rain, and (iv) little rain throughout the year.
- (f) The natural regions.
- (g) Areas which produce cocoa, cotton, bananas, sugar, maize, manioc, coffee, wheat, barley, vines, fruits, hides, meat products, wool, quebracho, Yerba Maté.
- (h) Areas which produce petroleum, copper, silver, tin, nitrates, gold, diamonds, coal, iron ore.
- (i) The position of Trinidad, Maracaibo, Barranquilla, Guayaquil, Callao, Mollendo, Arica, La Paz, Manaos, Para, San Paulo, Rio de Janeiro, Pernambuco, Bahia, Cordoba, Santa Fé, Mendoza, Tucuman, Rosario, Buenos Aires, Montevideo, Bahia Blanca, Valparaiso, and Santiago.
- (j) The two trans-continental railway lines.

EXERCISE II

(1) Compare and contrast as fully as you can the following regions—

- (a) The Amazon Valley and Ganges Valley; *or*
- (b) Central Chile and South-western Australia, *or*
- (c) Argentina and the St. Lawrence Valley of Canada.

(Consider position, climate, natural regions, human activities, and density of population.)

(2) Do you consider that the countries of South America are likely to become of much greater importance than at present? Give reasons for your opinion.

(Consider possibilities of expansion (a) agriculturally, and (b) industrially.)

CHAPTER XII

EUROPE

BRITISH lands in Europe include the British Isles, Isle of Man and Channel Islands, Gibraltar, Malta, and Cyprus.

A. Position

EUROPE proper extends from the Mediterranean Sea in the south, to the Arctic Ocean in the north, and from the Atlantic in the west to the Urals-Caspian Sea line in the east. The chief lines showing position are the latitude lines of 40° N., 60° N., $66\frac{1}{2}^{\circ}$ N. (Arctic Circle), and the longitude lines of 0° and 60° E.

On an atlas map the full significance of Europe's position is not well shown, but examination of a globe clearly reveals that Europe is situated almost centrally in the land hemisphere of the world. This factor, which places Europe within comparatively easy reach of most of the earth's surface, has considerably aided the development of the shipping activities of the European countries

B. Physical Features

1. SEAS AND ISLANDS

Most of Europe is composed of large peninsulas, between which are found penetrating seas, such as the White Sea (66° 0' N. 37° 0' E.), Baltic Sea, Gulf of Bothnia and Gulf of Finland, Bay of Biscay, and the Mediterranean and Black Seas. Within these last-named examples are found smaller seas, such as the Tyrrhenian (40.20° N. 12° 0' E.), Adriatic (43° 0' N. 15.0° E.), Ionian (38° 30' N. 18° 30' E.), Aegean (38.20° N. 25.20° E.), and the Sea of Azov (46° 0' N. 36° 30' E.). Off North-west Europe is found an extensive continental shelf.

As a result of these factors, Europe has a longer sea line for its area than any other continent, and the distances from even the most interior regions to the sea are comparatively small. This close association of land and sea encouraged

man to use the sea from earliest times, and the training and experience received have enabled the peoples of Europe to progress as fishermen, voyagers, discoverers of lands overseas, and the carriers of the world's commodities.

Off the broken coastlands are found various island groups, the most important of which are the British Isles, Iceland, Spitsbergen (79 0 N 20 0 E), Lofoten Islands (68 30 N 15 0 E), Frisian Islands (53 0 N.-53 30 N 6 0 E.-7 0 E), Azores (39 0 N 36 30 E), Balearic Islands (39 40 N. 3 0 E), Sardinia (40 0 N. 9 0 E), Corsica (42 10 N. 9 10 E), Sicily (37 30 N 14 0 E), the Aegean Archipelago (the group of small islands in the Aegean Sea), Crete (35 15 N 25 0 E), Cyprus (35 0 N 33 0 E), and Malta (35 52 N. 14 26 E).

2 BUILD

Europe is, roughly speaking, built on mountain formation to north and south, a structure which leaves an extensive area of plainland in the centre

NORTHERN HIGHLAND SYSTEM

In the north, the highland region covers Norway, much of Sweden, and the mountainous areas of the British Isles. The agents of denudation have cleared away the surface soil from much of this highland area, and this fact, combined with its elevation and exposure, makes it bleak and bare. The western coastlands, especially of Norway and Scotland, are marked by deep sea inlets, known as fiords

SOUTHERN MOUNTAIN SYSTEM

In Southern Europe is found a complex mountain system, consisting of mountain chains, plateaux and block mountains, and almost enclosed plains

In Spain, we have the Central Plateau, known as the Meseta, which is bounded to the north by the Cantabrians-Pyrenees mountain chains, and to the south by the Sierra Nevada. In France, the area immediately to the west of the Rhône is marked by the plateau of the Central Massif, while to the east lie the Jura and the French Alps. This last-mentioned group forms part of the Great Alpine mountain system, which includes the Apennines, Alps of

Switzerland Italy and Austria, Dinaric Alps, Carpathians, Balkans, and the Caucasus

Plateaux and block mountain formations cover considerable areas. the most important examples being Central Switzerland, Vosges, Black Forest and Rhineland mountains, North-west Czechoslovakia (the "Bohemian" Massif); while between the mountains are found extensive plains, of which the Hungarian plain and the Po Valley of Italy are noteworthy examples. A rift valley plain occurs, between Basle and Mainz, in the Rhine valley.

THE CENTRAL PLAINS

Between the north-western highlands and the southern mountain system lies the Central European plain, which covers large areas of the British Isles, France, Belgium, Holland, North Germany, Poland, and Russia. Throughout this plain many irregularities are found, but the hilly regions seldom reach an elevation of more than 1000 ft. It is very interesting to note that most of the great coal-fields occur at the junction of plainland and hills

The soils vary throughout the plain, and as a result the crops grown vary from place to place. In spite of this, the agricultural activities throughout the Central European plain are alike in one respect—intensive agriculture is the rule. Rotation of crops is practised, and the keeping of cattle is generally included with the arable farming schemes.

3. RIVERS

The main watershed in Europe is the southern mountain system, and from here flow such important streams as the Garonne, Loire, and Seine in France, the Rhine, Elbe, and Oder in Germany, the Vistula in Poland. On the southern side of the watershed are found the Guadalquivir in Spain, the Rhône in France, and the Po in Italy.

The Danube pursues an intricate course. In its journey from the Black Forest of Germany to the Black Sea, it flows through Austria, Hungary, Yugoslavia, and Romania, and in so doing it cuts through mountain ranges. Between the Carpathians and the Balkans, the river flows through

or south-west, and further, there is no great north-south mountain barrier to prevent their penetration inland. (Contrast with this the case of Canada, where the Rockies act as an effective barrier to the penetration inland of oceanic effects) In Europe, as with other continents,

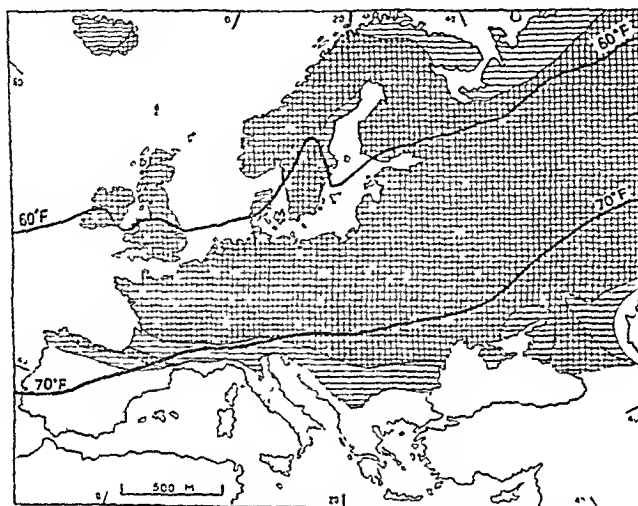


FIG 79B TEMPERATURE AND RAINFALL CONDITIONS OF EUROPE IN JULY

distance inland causes more extreme conditions and decreasing rainfall, but these "continental" characteristics would be more definitely marked were it not for the factors outlined above

The warming effect of the ocean, combined with the westerly winds, is very clearly indicated by the January isotherm of 32°F . (See Fig 79A) Notice that Western Norway, Western Germany, and Southern Russia experience similar conditions in January, although the difference in latitude between the most northerly and southerly of these regions is about 20° .

The countries bordering the Mediterranean are affected by the seasonal movement of the wind belt, and lie in the tract of the westerly rain-bearing winds in winter and in the dry North-east Trades in summer. A total rainfall of 20-30 inches, falling almost entirely in winter, is the result,



FIG. 81. NATURAL REGIONS OF EUROPE (Simplified)

and thus such regions as Spain (south of the Cantabrian-Pyrenees) the Mediterranean coastlands of France, the peninsula of Italy and the coastlands of Yugoslavia and Greece, experience the Mediterranean type of climate.

D. Natural Regions

Apart from the mountains, where altitude causes modification of climatic conditions, the natural regions of Europe, based on the vegetation growth, follow the general distribution outlined in Chapter IV. It must be borne in mind that considerable areas, especially those of the deciduous forest and southern coniferous forests, have now been cleared, and the land devoted to farming.

1. THE TUNDRA

This type of vegetation is found in the extreme north of Norway, Sweden, Finland, and Russia. These regions support a scanty population of Lapps, who manage to exist by fishing and wandering with herds of reindeer. These regions are generally unimportant.

2. THE COLD TEMPERATE (CONIFEROUS FORESTS)

The southern limit of the coniferous forest belt runs roughly along the line of latitude 60° N., and this region thus includes most of Norway and Sweden, Finland, and Northern Russia. The softwood is in great demand in many other European countries, especially England, and large quantities are exported. From Russia the timber, *largely in the raw state*, is exported via Archangel and Leningrad, whereas in Finland, Sweden, and Norway, hydro-electricity is used in the preparation of wood products. Hence, these regions export softwood timber, pulp and paper, and miscellaneous products such as matches. Turku or Åbo ($60^{\circ} 30' \text{ N } 22.15' \text{ E}$), Helsingfors ($60^{\circ} 20' \text{ N } 25^{\circ} 0' \text{ E}$), the small ports along Eastern Sweden, and Bergen ($60^{\circ} 20' \text{ N } 5^{\circ} 20' \text{ E}$) in Norway, are all actively engaged in the export of these products.

Even where the forest has been cleared, the climatic conditions make agriculture difficult. Barley is grown in small quantities, while considerable quantities of hay are grown and fed to dairy cattle. Norway is even more unfortunate than the other regions, for she possesses only very limited lowland areas suitable for agriculture. In spite of this difficulty, Norway ranks with Sweden and Finland as an exporter of dairy produce, especially butter.

The poverty of the land, combined with the seamanship learned from sailing in the sheltered seas and fiords, has encouraged the men of the coniferous forest coastlands to turn to the sea as an additional means of livelihood. Fishing and the whaling industry have thus become important, and a considerable export of fish takes place from Bergen, Hango ($59^{\circ} 50' \text{ N. } 23^{\circ} 0' \text{ E.}$), and Archangel ($64^{\circ} 35' \text{ N. } 40.50' \text{ E.}$).

3. THE COOL TEMPERATE · WEST MARGINAL (DECIDUOUS FOREST)

Areas This type of vegetation was once extensive, covering as it did the areas which now comprise the British Isles, much of France, Germany, Belgium, Holland, Denmark, South Sweden, the Baltic territories formerly known as Estonia, Latvia, and Lithuania, Poland, Central Russia, Central European regions such as Central Switzerland, and lowland regions in Austria, Czechoslovakia, Hungary, Romania, and Bulgaria

The Alpine Regions The Alpine regions introduce a modification, for in the mountains the deciduous forest type is confined to the lower slopes and valleys, for at higher altitudes this gives way to coniferous woodlands and eventually to grassland. This belt of grassland, which is known as the "Alp," is often snow-covered in winter, but during the summer it provides excellent pasturage for sheep, goats, and cattle. In many areas, and especially in Switzerland, the cattle are kept in sheds in the valleys during the winter and fed on fodder crops such as hay and roots, and move to the "Alp" pastures after the melting of the snows. Here cattle and their tenders live throughout the summer months. Food for the human members of this mixed community is sent up from the village in the valley, and in return milk is sent down for the preparation of dairy produce. This seasonal movement of human beings is an excellent example of migration.

Included within the boundaries of the deciduous area proper are the most important countries of Europe, such as the British Isles, France, Germany, Poland, Italy, and Russia, and we shall do well to consider them more fully at a later stage. There are, however, many important general factors which can be dealt with under this broad heading.

Forest Products Throughout the region the characteristic forest growths are the oak, birch, beech, and elm, which are used for building, the manufacture of furniture, and allied industries. In regions well inland, such as Southern Germany, Switzerland, and Czechoslovakia both hardwoods and softwoods are used in the preparation of toys and musical instruments. A great deal of labour and

workmanship is put into these products, and they are, therefore, of small bulk and high value, facts which enable them to withstand the costs of transport to the coast

Agriculture. The deciduous forest growth has been cleared over considerable areas, and where this has been done the soil is generally capable of producing *varied crops*. Mixed farming and the rotation of crops is the general rule, but climatic factors cause various agricultural activities to be most important in certain areas. *Oats*, for example, are important in the cooler north-western and central regions of Europe, and are grown in large quantities throughout the Central European plainlands

Wheat, on the other hand, demands drier and sunnier conditions, and is grown mainly in regions which are sheltered by hills from the rain-bearing westerlies.

Over the eastern half of the Central European plain, the production of wheat could be important but for the fact that the soils are here too poor. As a result, the chief wheatlands in the deciduous forest area are found in *Eastern England*, *Central and Eastern France*, the plain of *Hungary* and *Western Romania*. The *hot summers* of *Hungary* and *Romania* allow the cultivation of *maize*; while the production of *sugar beet* in addition to wheat and maize, makes these two countries primarily agricultural. Budapest and Bucharest have many industries connected with the preparation of this produce for market, such as flour-milling and sugar manufacture, and large quantities of foodstuffs move up the Danube valley to Central Europe and down the Danube to the Black Sea ports of Galatz (45 27 N. 28 0 E.) and Constanta (44.10 N. 28 38 E.). This last-named port owes its development largely to the fact that it is ice-free throughout the winter.

On the *poorer soils* of *Germany*, *Poland*, *Lithuania*, *Latvia*, *Estonia*, and *Central Russia*, rye is the most important cereal crop, and is used almost entirely in making bread. *Potatoes*, too, are grown in huge quantities, especially in the *Baltic coastlands* and *Central Russia*, where they rank as important foodstuffs.

The keeping of *cattle*, both for *beef* and *dairy produce*, is important throughout the whole region, and while such

activities are often part of the mixed farming scheme, some areas have specialized in the production and export of dairy produce

Denmark, for example, produces many root crops such as swedes and turnips, and uses them, together with imported dairy foodstuffs, to feed her cattle, pigs, and poultry. Fishing is another important human activity, and fish products are exported from Esbjerg (55 28 N 8 30 E). Most of Denmark's export trade, however, consists of butter, bacon, and eggs, and is handled mainly by the port of Copenhagen (55 40 N. 12 30 E). Apart from its importance as a port, Copenhagen has a valuable strategic position in that it commands the entrance to the Baltic.

Holland, too, has specialized in the production of dairy produce, although she, unlike Denmark, also produces considerable quantities of rye, oats, barley, and potatoes.

Immediately behind the coast are found low-lying tracts below sea-level, known as the polders. The windmill, so often featured in pictures of Holland is merely an agent employed in draining these swampy tracts. The rich grassland of the moist polders is very suitable for dairy cattle and horses, and as a result Holland is enabled to produce and export cheese and butter. Of recent years parts of the Zuider Sea have been drained and the area of "polders" in Holland thereby increased. Reclamation of this shallow sea is not yet finished, and Holland is annually adding to its land. Along the coastland, behind Haarlem (52 23 N. 4 37 E) bulbs, especially narcissi and tulips, are grown, and a great export trade in bulbs has been built up.

The chief ports handling the trade of Holland are Amsterdam and Rotterdam. The latter, situated as it is at the mouth of the Rhine, handles a great volume of trade drawn from Germany, Switzerland, and Eastern France.

Russia The deciduous forest region of Russia has many head of cattle and poultry, and while dairy produce is still exported via Leningrad, the export since pre-War days has considerably decreased.

Belgium, the neighbour of Holland, is a region of mixed soils and intensive cultivation. All the usual cereal and root crops are grown, but outstanding products are tobacco

and flax, both of which give rise to industry. The manufacture of linen from flax is important in Tournai (50 30 N. 3 23 E.) and Ghent (51 0 N. 3 44 E.). The position of Brussels (51.0 N. 4 22 E.), the capital, Antwerp (51 13 N. 4 25 E.), the chief port, and Ostend (51 14 N. 3 0 E.), an important packet port, should be noted.

Outside Belgium, flax is grown chiefly in Lithuania, Latvia, and Estonia and, together with wood products, is exported from the ports of Memel (56 0 N. 21 0 E.), Riga (57.0 N. 24.0 E.), and Revel (59 26 N. 24.45 E.). The central regions of Russia also grow considerable quantities of hemp.

4. COOL TEMPERATE: INTERIOR LOWLANDS (THE STEPPES AND DESERT)

The steppes are the representation in Europe of the temperate grasslands. The soil here is extremely fertile. The colour of this soil has resulted in the designation of the term "Black Earth" being applied to the steppelands. The climate and soil conditions combine to make this one of the world's most productive granaries. In that part of the region which lies in Romania, huge crops of wheat, maize, barley, and sugar are grown, and a considerable proportion of these products is exported. The Russian steppeland area also grows great quantities of these crops, and, before the days of the Soviet Republic, large quantities of wheat were exported from the ports of Odessa (46 37 N. 30.16 E.) and Kherson (46 47 N. 32.43 E.). Most of the agricultural produce of Russia is, however, now used at home, and the export trade has consequently greatly decreased, although ultimately it may revive.

Towards the south-east, the steppeland area gives way to desert conditions.

5. THE WARM TEMPERATE: WEST MARGINAL (MEDITERRANEAN REGIONS)

The Mediterranean type of climate is experienced by Portugal and Spain (south of the Cantabrians-Pyrenees mountain system), the southern coastlands of France, Peninsula Italy, and the coastlands of Yugoslavia, Albania, and Greece.

Over most of these regions the olive, whose long, deep roots enable it to search for moisture during the summer drought, is characteristic. Among Mediterranean peoples olive oil takes a place in human diet akin to that of meat fats among the peoples of temperate latitudes.

Cultivation of the vine is widespread, and considerable quantities of vine products, such as fresh grapes, wine, raisins, and currants, are exported.

The usual cereals are wheat and barley, with maize on the wetter margins, while sheep and goats are kept in the drier regions and on the hill-sides.

Differences in position cause slight modifications of this general classification, and it would be well to survey the countries comprising Mediterranean Europe. The parts of Italy and France which come within this category will be dealt with later.

Portugal

This is a mountainous country, lies on the western margin, and receives the full force of the Westerlies during the winter season. As a result, the rainfall is heavy, and supports dense forests of which the cork oak is a prominent member. Apart from their production of cork, these oaks are valuable in that they supply large quantities of acorns, on which pigs are fed. Maize is grown throughout the country, while wheat is confined to the drier south. In the north, where the increased rainfall produces thick grass growth, many cattle are kept.

In sheltered regions and the river valleys all the usual Mediterranean crops are grown, and there is a huge export of "port" wine from Oporto, at the mouth of the Douro.

Sardine fishing is engaged in off the coasts, and the canned products are exported, chiefly from Lisbon (38 43 N. 9 10 W.) This port, situated near the mouth of the river Tagus, shares with Oporto (41 10 N. 8 38 W.) the export from Portugal of wine, cattle, cork, fruits, and sardines. Since Portugal is, like most Mediterranean countries, primarily agricultural, the chief imports are of manufactured articles, such as hardware, textiles, machinery, and coal.

Spain

The northern mountains and coastlands of Spain, which lie outside the Mediterranean regions proper, are most important agriculturally for the production of maize and cattle. Large quantities of high grade iron ore are mined and exported via Bilbao (43 16 N. 3 0 W.) and Santander (43 30 N. 4.0 W.).

Within the Mediterranean regions of Spain lie the Meseta and the southern and eastern coastlands. The rainfall from the Westerlies decreases with distance from the Atlantic, and over much of the Meseta the amount is insufficient for agriculture. Considerable areas here are given over to sheep, but in favoured regions, especially round Valladolid, wheat is extensively cultivated. As a result, Valladolid has wheat milling industries. Madrid (40 27 N. 3.42 W.), the other great town of the Meseta, owes its position as capital of Spain largely to its central position. Most of the railways of Spain, which run inland from the ports, focus on Madrid.

In the extensive plainlands of the river Guadalquivir to the south, the rainfall is sufficient for most of the usual Mediterranean crops, but those of chief importance are the vine and fruits. Seville (37 27 N. 6 0 W.), a port well upstream, handles much of the trade of the region, and its name has become widely known in connexion with the export of oranges.

The Mediterranean coastlands and the Ebro valley are, over much of their area, too dry for cultivation, but irrigation makes possible considerable production of fruits, vines, nuts, and cereals. The trade of the region, which consists of the exchange of these agricultural products for manufactured goods, is handled mainly by Malaga (36 46 N. 4.27 W.), Valencia (39.30 N. 1 22 W.), and Barcelona (41.24 N. 3.9 E.). The last-mentioned town is very progressive, and, in addition to possessing industries connected with the preparation of foodstuffs, also engages in the manufacture of textiles and machinery.

The position of Gibraltar (36.10 N. 5 20 W.), a British stronghold guarding the entrance to the Mediterranean, should be noted.

Yugoslavia and Albania

The Mediterranean region of these countries comprises the western mountain ranges. The usual Mediterranean crops are grown in the small areas of plainland, but much of the country is still wild and undeveloped.

Fishing off the coasts, and the tending of sheep and goats among the mountains, are other occupations engaged in by the small populations of these regions.

Greece

This country, too, is largely mountainous, but the plainland areas are more extensive than those of Mediterranean Yugoslavia and Albania. The chief cereals, which are used mainly for home consumption, are wheat and barley; while tobacco and vines are grown for export. Currants, derived from the grape vine, are a characteristic production of this country.

The trade, which is handled mainly by Salonika, consists of the exchange of agricultural produce, especially wines, currants, olives and olive oil, figs, and tobacco, for manufactured articles.

Athens (38° 0' N. 23° 42' E.), the capital of Greece, is situated well to the south.

E. Mineral Wealth

The mineral wealth and power resources of the European countries has been one of the main factors in their development, and the distribution of this wealth, especially that of coal, iron ore, and water power, should be carefully revised (Chapter V).

THE MAIN COUNTRIES OF EUROPE

FRANCE

A. Agriculture

This country, the second largest in Europe (Russia is the largest), lies partly within the deciduous forest area and partly within the Mediterranean regions. Apart from infertile and bleak areas in the Central Massif and the South-eastern Alpine mountain system, nearly all France

can be cultivated, and this country supports a very high agricultural population. Since the great proportion of the food produced is used at home, this fact tends rather to be overlooked.

Agriculture in France is of the intensive mixed farming

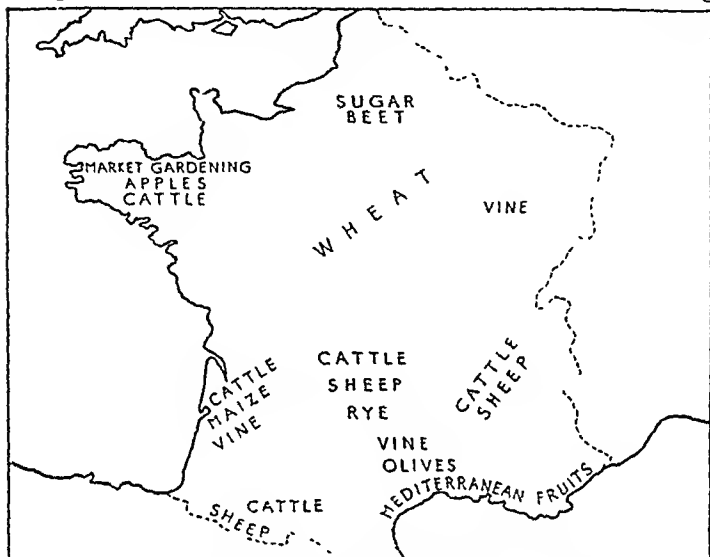


FIG. 82. OUTSTANDING AGRICULTURAL AND PASTORAL ACTIVITIES OF FRANCE

type, and much of the land is held by peasant farmers in the form of small holdings. The yield of crops is high, for the fertility of the soil is maintained by the use of manures, partly manufactured from potash deposits in Alsace. Along the northern coasts of Brittany, shelly sands and seaweeds are spread over the land, and help to maintain fertility.

While the crop productions are varied and widespread, some are of more importance in certain regions than others, and this distribution must now be considered.

1. FRUITS

Cider apples are grown in the north-west, especially in Brittany, but the chief fruit areas of France are to be found

in the Mediterranean areas, where there is less danger of the early blossom being spoilt by frost. Almonds, olives, apricots, and peaches are the chief fruits grown, and while much of this produce is sent by rail to the rest of France, there is also a certain export from Marseilles.

2 VINES

The production of vines is centred in the Mediterranean region, South-west France, and Eastern France. Strong and continuous sunshine is needed, and hence most of the vineyards are found on hill-sides which have a southern aspect. Each of the great vine-growing areas markets a special type of wine, the chief examples of which are Champagne and Burgundy from regions in Eastern France of those names, and Cognac from Aquitaine in South-west France. From the Mediterranean region there is also a considerable export of grapes and *vin ordinaire*.

3 CATTLE AND SHEEP

The chief cattle and sheep areas are the highland regions and infertile areas which are unsuitable for arable farming. The live stock industry is also connected with mixed farming, for fodder crops are grown in the lowlands and many animals are sent down from such areas as the Central Massif, Alps, and the Pyrenees for stall feeding during the winter.

Brittany is another area which tends to specialize in the production of cattle products.

4 WHEAT

Wheat, the staple crop of France, is grown throughout the lowlands, but the chief area of production is to be found in that part of the Central European plain around Paris (48 52 N 2 19 E). In spite of the fact that France ranks after Russia as Europe's leading wheat producer, not enough is grown to feed the large population (40,000,000) of France, and large quantities are imported.

5 MAIZE AND FODDER CROPS

The Garonne basin in the south-west of France has a heavier rainfall and warmer conditions than the rest of the plainland, and as a result considerable quantities of

maize are grown. Much of this is used as a fodder crop, and as a result a large number of cattle are kept in these lowlands.

Other fodder crops, especially lucerne, clover, and roots, are widespread throughout the lowland areas of France, while the special suitability of soil and climate make the region north-east of Paris of great importance for sugar beet. As an example of the intensive mixed farming methods employed, it is interesting to note that the pulp waste from the beet is fed to cattle during the winter season, when it is impossible for them to feed on the meadow pastures

6. RYE AND BUCKWHEAT

These crops are grown in small quantities in highland regions of poor soils, such as are found in the Central Massif and the interior regions of Brittany.

7. MARKET GARDENING

The chief market gardening areas are those which have climatic conditions suitable for the *early* production of vegetables and flowers. The coastlands of Brittany, for example, experience very mild winter and spring conditions, which allow of the early growth of potatoes, onions, and tomatoes. Much of this produce is sent to Paris and to England.

The Mediterranean region is another area suitable for market gardening, and sends vegetables and flowers to the other regions of France. In this region a perfumery industry, based on the production of these flowers, has also grown up.

B. Industry

For industry France has many natural advantages. She possesses coal-fields in the north-east and in small pockets around the Central Massif, but the home production has to be supplemented by imports. There are also iron resources in Lorraine and the Central Massif, water-power possibilities in the Alps, and a large home market. Further, France is fortunately placed in that she faces both the Atlantic and the Mediterranean, and is thus in a good position

for trade with the rest of Europe, America, Africa, and the East. Raw materials in which France is lacking can thus be easily obtained. Apart from the preparation of agricultural products for market, such as flour milling, manufacture of dairy produce and beet refining, the chief industries of

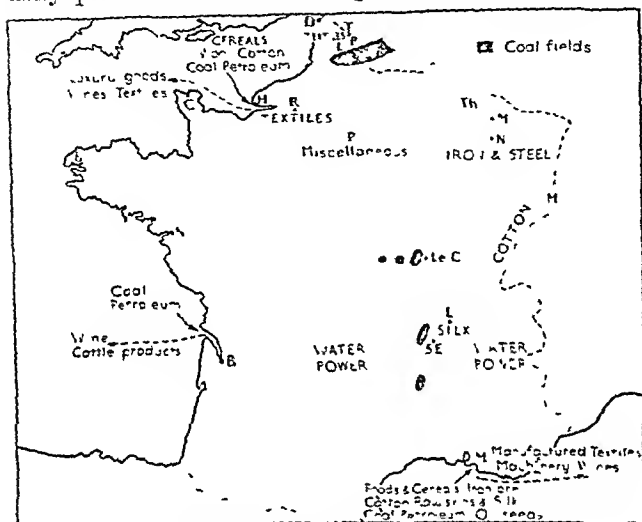


FIG 83 POWER RESOURCES, INDUSTRY, AND CHIEF PORTS OF FRANCE

Identify each of the ports and industrial towns (indicated by initials.)

France are connected with the manufacture of textiles, and iron and steel goods

1 TEXTILES

For the *cotton* industry, raw cotton must be imported, and the chief ports engaged in this traffic are Havre, Rouen (49° 27' N 1° 6' E), Dunkirk (51° 0' N 2° 22' E), and Marseilles. In the north-eastern coal-fields such towns as Lille (50° 38' N 3° 0' E), Roubaix (50° 40' N 3° 8' E), and Tourcoing (50° 44' N 3° 9' E) are of chief importance in spinning; while the ease of importing raw materials, both cotton and coal, has made

Rouen a cotton manufacturing centre. In the Vosges regions, the industry has developed from the domestic spinning industries, and Mulhouse (47.44 N. 7.15 E.) is now a great factory centre of cotton spinning.

The *woollen* industry, which originally used the home production of wool, was at one time widely scattered, but since the factory system has developed, the north-eastern coal-field has become the chief area of importance. Raw wool is now brought from the great sheep lands of the Southern Hemisphere, and imported via Havre, Rouen, and Dunkirk. These three ports, as well as Roubaix and Tourcoing, have all developed woollen manufactures.

Silk. The lower Rhône valley and the southern coastlands of France experience the Mediterranean type of climate, and, as a result, the cultivation of the mulberry, upon the leaves of which silkworms feed, is widespread. The rearing of silkworms and the manufacture of silk was, at one time, a cottage industry, but factories, using coal from the St. Étienne field and hydro-electricity from the Central Massif and the Alps, have now developed in many towns in the Rhône valley. The industry has grown, and much raw silk is now imported from Northern Italy and China. The industry is centred mainly in Lyons.

2. IRON AND STEEL

More than 95 per cent of the iron ore raised in France is mined in the Lorraine district, especially around the towns of Nancy, Metz (49.7 N. 6 10 E.), and Thionville (49 21 N 6 20 E.). As a result, iron and steel industries have developed in Lorraine in spite of the fact that the area is lacking in power resources. This is overcome by the transport of coal into Lorraine from the north-eastern coal-field and the Ruhr region of Germany.

On the coal-fields themselves the manufacture of iron and steel goods and machinery is also important. The north-eastern coal-field, for example, is engaged in the manufacture of textile machinery, the Le Creusot region (47.0 N 4.26 E) produces armaments, while that of St Étienne (45.27 N. 4.22 E.) is engaged in general iron and steel manufactures.

3 PARIS

The capital of France, like London, has a great variety of manufactures, but the one which is most widely advertised is in connexion with luxury products and clothing

C. Transport, Trade, and Ports

For the movement of goods, France is well supplied with railways, roads, and navigable waterways. Of the last, the chief are the Seine, Meuse, Rhône, Garonne, and Loire. (Revise the section dealing with France in Chapter VI.)

In spite of the fact that France produces large quantities of food at home, the production is insufficient for her requirements, and considerable import takes place, France is also deficient in some of the raw materials for manufacture, consequently, we find that France imports cereals, coffee, wool, cotton, raw skins, raw silk, coal, and petroleum

The exports are mainly manufactures, and include specialized types of agricultural produce such as wines, flowers and table fruits, machinery and textiles

The following are some of the French Trade statistics for 1947—

IN MILLIONS OF FRANCS

	Imports	Exports
Gt Britain	11,192	14,863
Belgium	18,080	25,878
U S A	91,342	5,703

This export trade is handled by many ports, but those of outstanding importance are Marseilles, which has also developed industries of its own such as oil refining and soap manufacture, Bordeaux, Havre, Rouen, and Dunkirk.

Of the other ports, Cherbourg is an important point of call for transatlantic shipping; Brest (48° 28' N 4° 30' W.) is a naval base, and Nantes (47° 45' N. 1° 35' W.) is engaged in shipbuilding

GERMANY

The following paragraphs refer to the position of Germany before the Second World War. At the time of writing, the position is not settled, and it is not possible to say what the future position of the country will be.

The size of this country decreased considerably as a result of the alteration of European boundaries at the Treaty of Versailles, and Germany in 1939 measured 182,200 square miles, as against 208,800 square miles in 1914. On the western boundary, Germany lost territory to Belgium, and temporarily ceded the Saar coal-field area to France as compensation for war damage. This coal-field was, however, returned to Germany in 1935 as a result of a plebiscite vote of the Saar population.

Elsewhere, North Schleswig (53° 0' N. 9° 0' E.) was given to Denmark; parts of Posen (52° 25' N. 17° 0' E.), West Prussia (53° 40' N. 18° 20' E.), and Upper Silesia (50° 20' N. 19° 0' E.) to Poland; the district round Memel to Lithuania, while Danzig (54° 19' N. 18° 39' E.) and the surrounding territory became a Free State.

A. Agriculture

As in France, agriculture in Germany is of the intensive mixed farming type, and the rural districts over much of the country are densely populated. As an indication of the intensive nature of the agriculture here, it may be mentioned that there are over five million farms in Germany of which three million are less than five acres in extent. The possession of great salt deposits at Stassfurt (51° 52' N. 11° 38' E.) helps the maintenance of soil fertility. As in France, however, some regions are more important than others for certain products.

Over the northern part of the North German plain, and in the Alpine foreland area near the frontiers of Switzerland and Austria, dairy farming is of especial importance, and to this end hay and other fodder crops are grown. Throughout the whole of Germany rye, potatoes, and oats are cultivated, while the main areas of wheat, barley and sugar beet are to be found in Westphalia, the Rhine rift valley, and the area just north and east of the Erz Gebirge and Sudetes mountains. Large mills have been established throughout these regions to deal with the agricultural produce, and Magdeburg, Hanover (52° 25' N. 9° 46' E.), Breslau, Leipzig (51° 20' N. 12° 20' E.), and Frankfurt-on-Main (50° 10' N. 8° 42' E.) are of outstanding importance as

markets and centres for factory processing of the agricultural produce. In this connexion grain-milling and the production of sugar are outstanding activities.

The production of hops is confined mainly to the warmer slopes of the south, where Munich (48° 8' N 11° 30' E) is well known for the preparation of beer. Vines are grown in sheltered river valleys, especially those of the Rhine, Moselle, and Main, each of which produces large quantities of characteristic wines.

B Industry

Germany is rich in power resources, for she possesses large quantities of coal and lignite, together with great possibilities for the development of hydro-electric power in the southern highland regions. In early days, the domestic system of manufacture was widespread, but the development of the factory system has caused the concentration of the chief manufacturing activities on the coal-fields. This industrialism has developed to such an extent that more than one-fifth of the total population is actively engaged in factories.

For many of her raw materials, other than power requirements, Germany has now to depend on imported goods. Iron ore, for example, is imported from Lorraine in France, Sweden, and Spain; while cotton comes from the U.S.A., Egypt, and India. The home production of wool is considerable, but even this amount has to be supplemented by imports from the temperate grasslands of the Southern Hemisphere, especially those of Argentina. (*N.B.* This was the position up to 1939. At the present time (1948) the position is complex and fluid as full trade is not yet fully re-established.)

The main coal-fields are to be found in the Saar valley, Rhine-Ruhr region, Saxony, and Upper Silesia. Apart from coal mining, the chief industries engaged in are the manufacture of textiles and machinery.

1 IRON AND STEEL MANUFACTURE

This activity is common to all the three main coal-fields, but the Rhine-Ruhr area is of greatest importance. Along

the Ruhr valley in particular this industry gives rise to a number of large towns and settlements which almost merge one into the other. Dortmund (51.33 N. 7.28 E.) and Essen (51 28 N 7 0 E) are the chief centres for smelting and the preparation of heavy iron goods and machinery, but considerable smelting and the manufacture of somewhat lighter articles are also carried on at Dusseldorf (51 17 N.



FIG 84 THE ZONES OF GERMANY

6 48 E.), Duisburg, and Cologne. The Rhine is of great assistance for the transport of the bulky iron ore and foodstuffs required for this region, for ocean steamers can proceed as far as Duisburg. Germany has attempted to divert this traffic from the Dutch port of Rotterdam to her own port of Emden (53 22 N. 7 12 E.) by means of the Dortmund-Ems Canal, but this has been merely moderately successful.

Cologne, which has already been mentioned in connexion

with the manufacture of machinery, is worthy of further notice in that it is an important bridge-town over the Rhine, and is engaged in the manufacture of foodstuffs and luxury articles

On the Saxon coal-field, iron and steel manufacture is of relatively little importance, but in South-eastern Silesia this industry is again prominent. The coal-field is here divided by the boundary line between Germany and Poland, and, as a result, the iron and steel industry of the Upper Silesian coal-field is shared by Poland

In the main ports, the ease with which the raw materials can be collected has helped in the establishment of engineering and shipbuilding industries. Very important in this connexion are Hamburg, Stettin, and Kiel (54 17 N. 10.7 E.).

2 TEXTILES

On or near the Ruhr coal-field area are textile manufacturing towns such as Barmen (51 18 N. 7 11 E.), Elberfeld (51 17 N. 7 8 E.), Crefeld, and Cologne, while on the Saxon field are Chemnitz (50 48 N. 12 50 E.) and Zwickau (50 41 N. 12 27 E.)

Cotton and woollen goods are manufactured in these towns, and there is no regional specialization such as is found in England, where Lancashire engages in cotton manufacture and Yorkshire in woollen manufacture. Crefeld is, however, most widely known for the production of its silk goods

It is interesting to notice that much of Germany's large import of raw cotton takes place through the port of Bremen (53 7 N. 8 49 E.)

C. Transport, Trade, and Ports

Germany is well served with railways, and, as previously mentioned in Chapter VI, the main rivers of Germany, such as the Rhine, Weser, Elbe, and Oder, have a south-east north-west trend which makes easy the building of communicating canals. As a result the large navigable rivers of Germany are linked up, and there is a considerable transport of heavy goods by internal water transport.

The position of Berlin (52 31 N. 13 20 E.), the capital, is noteworthy. Situated on the river Spree, Berlin has canal

communication with both the Elbe and the Oder, and is thus easy of access from Stettin and Hamburg. Of more importance, however, is the fact that Berlin is a focal point of railways from all parts of Germany. Its position as a focal point has encouraged development as a centre of administration and general manufactures.

Germany has many ports, but those facing the Baltic Sea are not ice-free throughout the year. Such ports as Königsberg (54 43 N. 20 34 E.) in East Prussia, Stettin, and Lübeck (53 53 N. 10 43 E.), are thereby handicapped during the winter season, although ice breakers are used to prevent the total stoppage of shipping activities. The ports of Hamburg and Bremen are more fortunate in that they face the North Sea, which gives them the advantage of being ice-free, and also a better situation for world trade than the almost enclosed Baltic Sea.

Germany is largely industrialized, and therefore imports raw materials and foodstuffs, such as raw cotton, wool, iron ore, petroleum, oil, fruits, dairy produce, and coffee. At one time Germany was even more dependent on foreign foodstuffs than at present, and used to import large quantities of wheat. This traffic has now largely decreased.

The export trade, too, has dropped considerably, and consists mainly of heavy iron and steel goods, textiles and clothing, chemicals, and electrical apparatus.

D Germany in 1948

At the present time Germany is split into four zones under the control of America, France, Russia and Britain. Berlin, the capital, is in the Russian zone, but is itself zoned. The industrial future of Germany depends largely

PRODUCTION IN METRIC TONS

	April 1946	May 1946	Percentage of Pre-war Average
Western Germany	4,043,000	4,453,000	40.0
France	4,044,000	4,142,000	107.0
Belgium	1,885,000	1,885,000	79.0
Netherlands	693,000	665,000	60.0

on coal output. It is therefore worth studying the table on page 277, and comparing the position of Western Germany with her neighbours.

It is particularly important to notice that in these two months the production in Western Germany was 60 per cent below pre-war average.

POLAND

The boundaries of Poland in 1939 resulted from the Treaty of Versailles. The boundaries abutted on Germany proper to the west, East Prussia (German) and Lithuania to the north, Russia in the East, Rumania in the south-east, and Czechoslovakia in the south.

A. Forests

One-quarter of Poland is still forested, mainly with mixed deciduous and coniferous species. Towards the north and north-east the conifers predominate, and give rise, especially near the rivers, to lumbering and pulp and paper manufacture. Bydgoszcz—or Bromberg (53 S N. 18 0 E)—situated on the great river of Poland, the Vistula, has important saw mills. A considerable amount of timber and pulp is exported.

B. Agriculture

Over about half of Poland arable agriculture is possible, and although the soils, except in the south, are generally poor, and the climate harsh and difficult, yet considerable crops are grown. Rye is the chief cereal, while potatoes and sugar beet are also important. This last-mentioned product was at one time an important export, but this trade is now decreasing. The potatoes grown are used as a food both for human beings and stock, in addition, large quantities are used in distilling and in the manufacture of starch.

Cattle, horses, and pigs are kept in large numbers, especially in the central plainlands.

C. Industry

In the south-west, Poland possesses part of the Silesian coal-field, while along the northern slopes of the Carpathians

are found oil reserves. Krakow and Katowice (50 17 N 19.3 E) are the chief towns on the coal-field, and have also become important centres for the production of iron and steel goods and machinery. Much of Poland's coal is, however, exported, some via Danzig and Gdynia and some via the German port of Stettin. The Vistula (which is navigable to Krakow) and the Oder are used for the transport of coal to the ports, and in the reverse direction convey iron ore, for the local production of ore is insufficient for the iron and steel industry.

The oil reserves are exploited round Krakow and Lwów (49 50 N. 24 0 E), and there is a considerable export of refined oil to the neighbouring European countries of Czechoslovakia and Germany.

Much of Poland's industry is thus connected with her raw materials and agricultural produce, but there is also a certain amount of cotton manufacture at Lodz (51 48 N 19 26 E) and Warsaw (52 17 N. 21.0 E), and for this industry the raw material must be imported.

D Communications, Trade, and Ports

Railways in Poland are not well developed, and this factor helps to retard development of the country. The river Vistula is a great highway running through the country, but its value for the transport of goods is decreased owing to the fact that it is liable to flooding. Again, the Vistula ends in a delta, and although there is good canal communication from the Vistula to Danzig, Poland dislikes the idea of sending her traffic through an internationalized port. While some of her trade still passes through Danzig, Poland is now sending more and more of her goods through her own port of Gdynia.

The fact that Poland is not yet using her natural resources to the full is shown in the fact that, apart from textiles, she exports raw materials in exchange for manufactured articles. Coal, timber, sugar (from beet), and textiles are the major exports, while raw wool and cotton, and machinery are the chief imports. Compared with that of France and Germany, the trade of Poland is very small.

E New Frontiers

The new Polish Frontiers (1945) should be studied. It is particularly important to notice that the Polish corridor has been abolished and Danzig has become a Polish port.

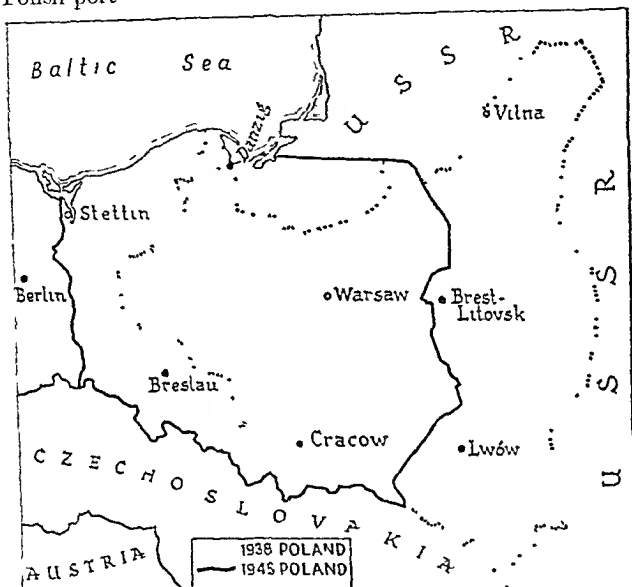


FIG 85 THE ZONES OF POLAND

RUSSIA

Russia consists of a number of Soviet Republics known as the U.S.S.R., and includes both Russia in Europe and Russia in Asia. The Russian Empire covers about one-sixth of the land area of the world, and Russia in Europe is by far the most extensive country in the continent.

At the present time, it is a matter of great difficulty to treat Russia adequately, for she is in the throes of an experiment which has already caused great changes in the human activities of the Russian peoples.

In an attempt to make the U.S.S.R. a great nation, and one which is as independent of other nations as possible, all buildings, land, forests, transport services, etc., were taken over by the State, and are now being developed and run by the State. Since 1927, when the first "Five Years' Plan" began, the avowed aim of Russia has been to make her soil more prolific in the production of crops, her industrial activities and manufactured requirements less dependent on foreign countries, and to provide a social life for the population which would surpass that of other lands.

A. Agriculture

In this experiment Russia possesses certain natural "apparatus." Because of her huge area, she possesses regions in the tundra, coniferous forest belt, deciduous forest belt, steppes, and deserts. (See Fig 86.) The range of agricultural produce is, therefore, wide, and developments are proceeding for the more productive use of the ground. In 1935, for example, nearly one million individual farms were combined into about five thousand collective farms, and in the year 1936 a great increase in the mechanization of agriculture was made. Much of the forest land is being cleared, and agriculture is being pushed into the Arctic Circle, where (as far as conditions allow) vegetables, grain, cattle, and pigs are being produced.

B. Industry

Russia possesses power resources. Coal is mined in the Donetz basin around Kharkow (49.50 N. 36 15 E.), on the Tula field (54 17 N 37 35 E.), near Moscow, and in the Perm district. In addition, Russia possesses rich petroleum deposits around Baku on the shore of the Caspian Sea.

These power resources, especially those of the coal-fields, are becoming more fully exploited. The Donetz field, which is situated near rich iron deposits, has blast furnaces and engages in the manufacture of iron and steel and engineering products such as railway equipment.

The Tula field supports engineering and textile industries in and around Moscow. Some raw cotton is imported, but irrigation projects are being carried on in Southern Siberia

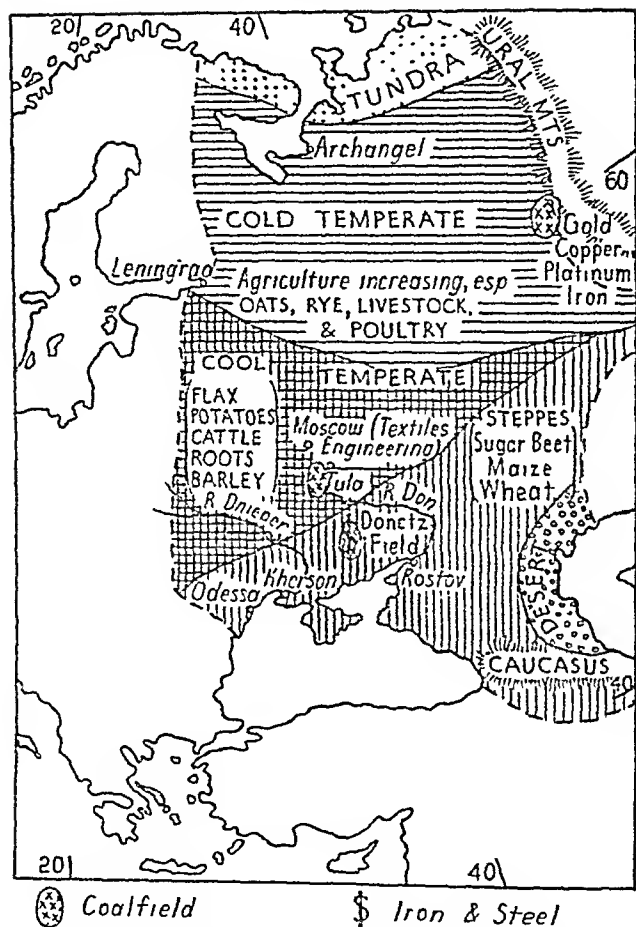


FIG 86 ECONOMIC FEATURES OF EUROPEAN RUSSIA

with the object of increasing the U.S.S.R. production of cotton and thus rendering this import unnecessary.

In the Urals are found platinum, copper, nickel, iron and coal, and the coal of the Perm coal-field is used in the smelting of this mineral wealth, and in supplying fuel to the Trans-Siberian Railway.

C. Trade, Communications, and Ports

As a result of this industrial activity, Russia imports considerably less manufactured goods than in the early days of the Soviet régime, but while her trade has decreased, it is still worthy of note. The chief exports are agricultural products, such as butter, cereals, and poultry; petroleum and coniferous woods; while the chief imports are meat, electrical machinery, and the raw materials for textile industries.

The Don and Dnieper are the chief rivers used for transport, for the Volga is practically useless, since it flows into the enclosed Caspian Sea, and the northward flowing rivers are icebound in winter. The main railways focus on Moscow, the capital.

Russia is fortunate in that she possesses ports on three seas, the White Sea, Baltic Sea, and Black Sea, but unlucky in that these seas are well away from the world's main shipping centre, the Atlantic. In addition, the ports on the White and the Baltic Seas, such as Archangel and Leningrad, are icebound in winter. The Black Sea ports of Odessa, Kherson, and Rostov (47 12 N 39 40 E) used to export huge quantities of wheat from the steppelands, but since the Revolution this traffic has greatly decreased.

ITALY

This country consists of mountainous Alpine territory in the north and north-west, a central plainland in the Po basin, and a broken system of ranges, small valleys and river valleys throughout the southern peninsula. The Po valley, or the Plain of Lombardy as it is called, is sheltered by means of the Western Alps and the Northern Apennines from the penetrating influence of the westerly winds in

winter, and thus has a more continental type of climate than the rest of Italy, which is mainly Mediterranean in type

A. Agriculture

Since much of Italy is hilly or mountainous, the amount of land available for agriculture is comparatively small, but, in spite of this difficulty, considerable quantities of varied crops are raised. In fact, the majority of Italy's population of 45,000,000 are engaged in this occupation. The usual Mediterranean crops are grown, but outstanding in importance are wheat and maize, the latter chiefly in the Po valley, grapes and olives. The chestnut is important as a foodstuff, while valuable crops, of which large-scale production is confined to certain areas, are lemons in Sicily and mulberry in the Alpine foreland to the north. This last-mentioned crop is responsible for Italy's export of silk.

Fishing is also engaged in, mainly in the Mediterranean, where tunny and sardines are caught

B Mineral Wealth and Industry

Italy possesses resources of sulphur in Sicily, marble in the Carrara region to the north of the River Arno, and iron in the small island of Elba (42 48 N. 10 20 E). Sardinia, which belongs to Italy, has valuable minerals, but little development has taken place.

Generally speaking, however, Italy is poorly equipped with the raw materials of minerals and power necessary for industry. In spite of this difficulty, manufacture has developed, and, to this end, raw materials, especially coal, are imported. This import of coal is still considerable in spite of the fact that the swift flowing streams of the Alps are being used in the production of hydro-electricity.

Apart from the preparation of the agricultural produce for market, an activity which includes the manufacture of wine and straw hats, the latter chiefly at Florence (43 47 N. 11 20 E) and Leghorn (43 33 N. 10.20 E.), industry in Italy is concerned with the manufacture of textiles and iron and steel goods.

Silk, cotton, and woollen goods are manufactured at Milan (45 28 N. 9 11 E.), Genoa (44 25 N. 8.57 E.), and Naples (40.52 N. 14.17 E.); motor cars and machinery at Turin (45.4 N. 7 44 E.), while Genoa is engaged in ship-building. Genoa and Naples owe their manufacturing activities to their positions as ports—a factor which results from the necessity of importing such raw materials as cotton, wool, iron ore, and coal.

Away from the ports, the manufacturing centres are found in the Po valley, and since this region is also highly developed agriculturally, it is scarcely surprising to find that it supports about half of Italy's total population. The Alps and Apennines are much less densely peopled.

C. Communications, Trade, and Ports

The Po is the only navigable river of importance, for the others, such as the Arno and Tiber, are broken by rapids and liable to flood. As a result, the railways are the most important means of communication. The main lines of Peninsular Italy run along the eastern and western sides of the Apennines and join up the main towns of Turin, Milan, Bologna (44 30 N. 11 22 E.), and Brindisi on the one hand; and Genoa, Leghorn, Florence, Rome, and Naples on the other.

The Trans-Apennine railways follow the river valleys—such as the Florence-Bologna line, or cross where the mountains are fairly narrow—such as that from Genoa to Milan and Turin.

Italy is cut off from the rest of Europe by the Alpine chain to the north, but communication is maintained by means of several important passes. The positions of the Cenis, St. Bernard, Simplon, St. Gotthard, and Brenner Passes should be noted. (See Fig. 87.)

The trade of Italy consists chiefly of the import of certain foods and the raw materials necessary for industry, and the export of other foodstuffs and manufactured articles. Wheat, tobacco, rubber, raw cotton, coal, iron ore, and wool feature as imports; while exports include olive oil, vegetables, wine, textiles, motor cars, sulphur, and marble.

This trade is handled by many ports, the chief of which

is Genoa, which has good communication inland to a very productive hinterland. The other port of the Plain of Lombardy is Venice (45 26 N 12 20 E), but this town is now shorn of most of its former greatness. Across the Adriatic are Trieste (45 39 N 13 48 E) and Fiume (45 20 N.

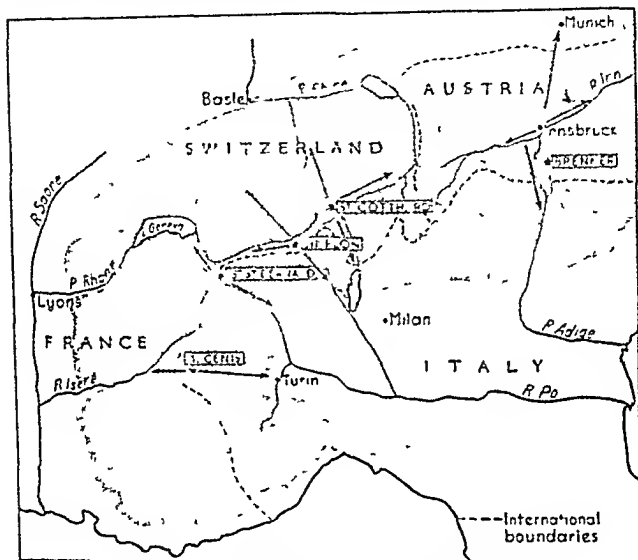


FIG 87 POSITION OF THE ALPINE PASSES

14 29 E), both of which act as ports for Yugoslavia rather than Italy

In Peninsular Italy Naples is important, while on the east coast Brindisi acts as a packet station and has recently developed a new value as a point of call for aircraft bound for Africa or the East

Sicily possesses good ports in Palermo (38 8 N. 13 25 E), Messina (38 12 N 15 22 E), and Catania (37 31 N 15 7 E), the last-named of which is situated near to Mount Etna

Italy is a poor country, and has a population which cannot

adequately be supported on the resources of her own land. For many years large numbers of Italians emigrated, but this has now ceased, and as a result, Italy has to import considerably more food than heretofore. Raw materials for industry are also necessary, and as a result of the factors of over-population and the need of raw commodities, Italy has turned to colonial expansion as a means of satisfying her needs. Consequently, before the war, she has added to her almost worthless colonies of Libya, Italian Somaliland, and Eritrea—the unknown country of Abyssinia. Now Abyssinia has become independent, and the fate of the other colonies is still rather unsettled.

MALTA

The chief importance of this British possession lies in its strategic position, which enables it to guard the routeway through the Mediterranean to the East. Its position should, therefore, be carefully noted.

THE MAIN EUROPEAN RAILWAYS

Most of the European countries possess a network of railways which usually centre on the capitals, but there are also continental lines of great importance, and these must now be considered.

1. The Northern Capitals Route

This line, which runs from Paris in the West to Moscow in the East, follows the Central Lowland plain of Europe throughout its whole course. From Paris, the line runs to Namur and Liege in Belgium, Cologne, Hanover and Berlin in Germany, Warsaw in Poland, and on to Moscow in Russia. From here there is communication to Leningrad and the East by means of the Trans-Siberian Railway.

2. Paris to Mediterranean Regions and South-eastern Europe

The capital of France is also the starting place of other important lines. The line to Madrid and Lisbon runs via Bordeaux and the western end of the Pyrenees, while a traveller from Paris to Italy has a choice of three railway routes. He can proceed via Dijon, cross the Juras to

1. Mont Cenis Pass
2. Simplon Tunnel
3. St Gotthard Pass
4. Brenner Pass

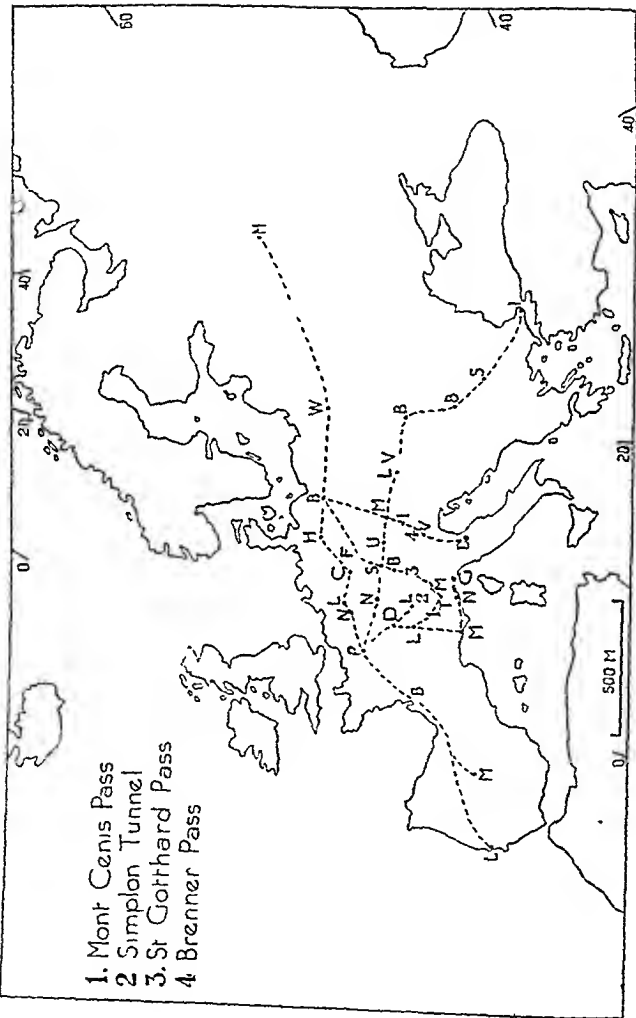


FIG. 88. THE CONTINENTAL RAILWAYS OF EUROPE
Identify each of the main lines and the towns indicated by initials.

Lausanne and the Upper Rhône, and then follow the Simplon Tunnel to Milan. From Dijon he can travel down the Rhône valley to Mâcon and then cross the Alps via the Mount Cenis Tunnel to Turin. The third line follows the Rhône valley to Marseilles, and then the coast route south of the Alps to Nice and Genoa.

From Paris also runs a continental line, known as the Orient Express, which has its terminus in Constantinople (Istanbul). In France the line follows the Marne valley to Naney, and then proceeds north of the Vosges by means of the Saverne Gap to Strasbourg. From here the Orient Express runs to Ulm and Munich and Linz, follows the Danube valley to Vienna, Budapest, and Belgrade, and then crosses the Balkans to Sofia and Constantinople.

3. Berlin to the South

The most important lines from Berlin southwards are those which run via Munich, Innsbruck, and the Brenner Pass to Verona and Bologna, and via Frankfurt, Basle, and the St. Gotthard Pass to Milan.

DENSITY OF POPULATION IN EUROPE

Considered as a whole, Europe is densely peopled, but there are certain regions which are of especial importance as regions of dense populations, and other areas where the population is relatively scanty.

Into the former category must be placed the coal-field and manufacturing areas. This statement should be followed out by comparing Figs. 34 and 88.

With this must be placed areas where agriculture is capable of supporting a large population, such as the Rhine valley, the Plain of Lombardy, and the very fertile parts of the Central European plain just north of the southern mountains.

Scanty populations are to be found in mountainous regions such as the Meseta of Spain, Alps, and Carpathians, the highlands of South-east Europe and Norway, the desert region round the Caspian Sea, and the Coniferous and Tundra belts to the North.

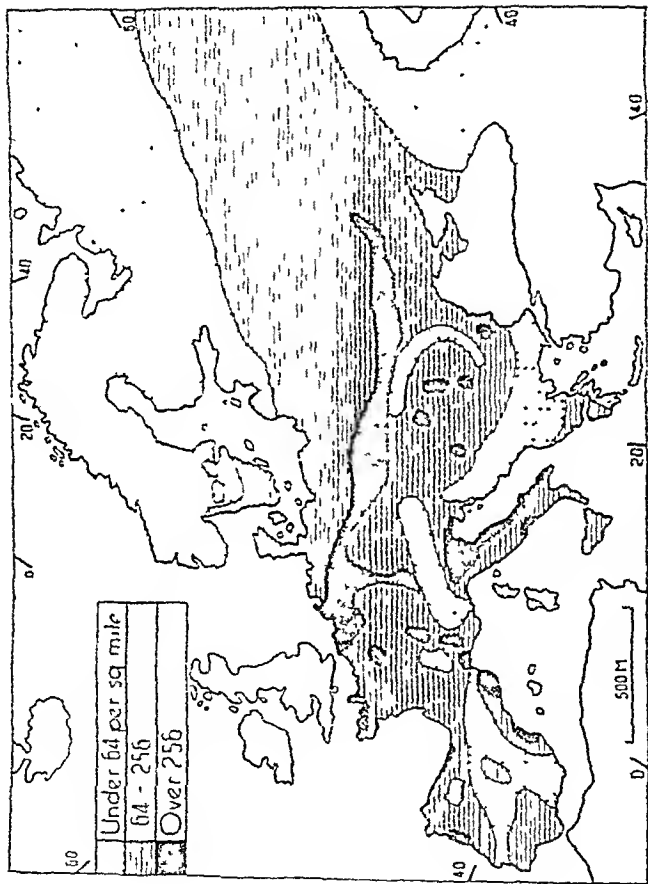


FIG. 89. DENSITY OF POPULATION IN EUROPE

ATLAS STUDY AND REVISION

Make certain that you can mark accurately, on a blank map of Europe, any of the following—

(a) The lines of latitude 40° N., 60° N. and the Arctic Circle, and the lines of longitude 0° and 60° E.

(b) Gulf of Bothnia and Gulf of Finland, Bay of Biscay, and the following seas: Mediterranean, Black, Tyrrhenian, Adriatic, Aegean, and Azov.

The following islands or island groups: Iceland, Spitzbergen, Lofoten, Frisian, Balearic, Sardinia, Corsica, Sicily, Aegean, Crete, Cyprus, and Malta.

(c) Spanish Meseta, Cantabrians, Pyrenees, Sierra Nevada, Central Massif, Juras, Vosges, Black Forest, Alps, Apennines, Carpathians, Dinaric Alps, Balkans, and Caucasus, together with the following plains: Hungary, Po valley, Rhine Rift valley.

(d) The Garonne, Loire, Seine, Rhine, Elbe, Oder, Vistula, Guadalquivir, Rhône, Po, Danube, Don, Dnieper, and Volga.

(e) The January isotherm of 32° F. and the July isotherm of 70° F. Areas which have (i) rain all the year round, (ii) most rain in summer, (iii) most rain in winter, and (iv) little rain throughout the year.

(f) The natural regions.

(g) Areas which produce large quantities of timber, barley, wheat, rye, oats, sugar beet, potatoes, flax, Mediterranean and temperate fruits, vine products. The chief cattle and sheep areas.

(h) The chief coal-fields and oil-fields, centres of hydro-electric development, together with areas producing iron ore.

(i) Areas which produce manufactured articles, especially textile and iron and steel goods.

(j) The Polish corridor, Danzig, and East Prussia.

(k) The towns of Archangel, Leningrad, Helsingfors, Bergen, Hango, Budapest, Bucharest, Copenhagen, Haarlem, Amsterdam, Rotterdam, Tournai, Ghent, Brussels, Antwerp, Ostend, Memel, Riga, Revel, Odessa, Kherson, Oporto, Lisbon, Valladolid, Madrid, Seville, Valencia and Barcelona, Gibraltar, Salonika, Athens, Havre, Rouen, Dunkirk, Marseilles, Paris, Bordeaux, Lyons, Strasbourg and Dijon, Berlin, Hamburg, Stettin, Lubeck, Hanover, Breslau, Frankfurt-on-Main, Munich, Cologne, Dusseldorf, Duisburg, Cologne, Dortmund and Essen, Warsaw, Gdynia, Moscow, Milan, Turin, Florence, Rome, Genoa, Naples, Fiume, Trieste.

(l) The main European communications.

(m) Areas of dense and scanty population.

EXERCISE 12

(1) Which countries in Europe produce the following commodities for export: softwood timber, dairy produce, and wine? For each commodity indicate two ports which engage in this export trade, and write short notes on the factors involved in their production

(2) Compare and contrast Portugal and Denmark.

(3) Describe the manufacture in *either* France or Germany, of (a) textiles, and (b) iron and steel goods. Stress the availability or accessibility of power and raw materials

(4) What do you understand by the term "Soviet Five Years' Plan"? Do you think that Russia is making progress towards her aims? (Give reasons for your answer.)

(5) Describe a journey from Paris to Constantinople.

(Physical features, human activities, chief towns)

CHAPTER XIII

THE BRITISH ISLES

A. Position

THE British Isles, which consist of England, Wales, Scotland, Ireland, and many small islands, lie entirely within temperate latitudes. Notice carefully the position of the lines of latitude 50° N. and 60° N., and the longitude lines of 0° and 10° W. Before the days of exploration our islands were tucked away, as it were, on the edge of the then known world—a world which centred on the Mediterranean Sea. Maritime development has, however, enabled regions which possess natural advantages for trade with the rest of the world to develop—at the expense of those wherein lay the great civilizations of early times. A good example of this is the British Isles, which is situated centrally with regard to the mainland masses of the world. Further, the island position eliminates the boundary disputes which constitute such great problems in the rest of Europe, but at the same time the distance from Europe is small, and trade with the Continent is, therefore, not hindered.

B. Seas and Coasts

The surrounding seas of the British Isles give advantages other than those of boundary security. The 100-fathom (600 ft.) line lies to the west and north, and since this depth indicates the edge of the continental shelf, it is seen that the British Isles are merely an uplifted part of this shelf, surrounded by very shallow seas. This shallowness enables the effect of the sun's rays to be felt throughout the water, and this allows the growth of plankton, which is an organism upon which nearly all fish life depends.

Further, the shallowness of our surrounding seas increases the tidal effect, and this increased difference between high and low tides aids the movement of ships, and also helps *the river estuaries to keep clear from sediment*. These factors are of importance in connexion with ports

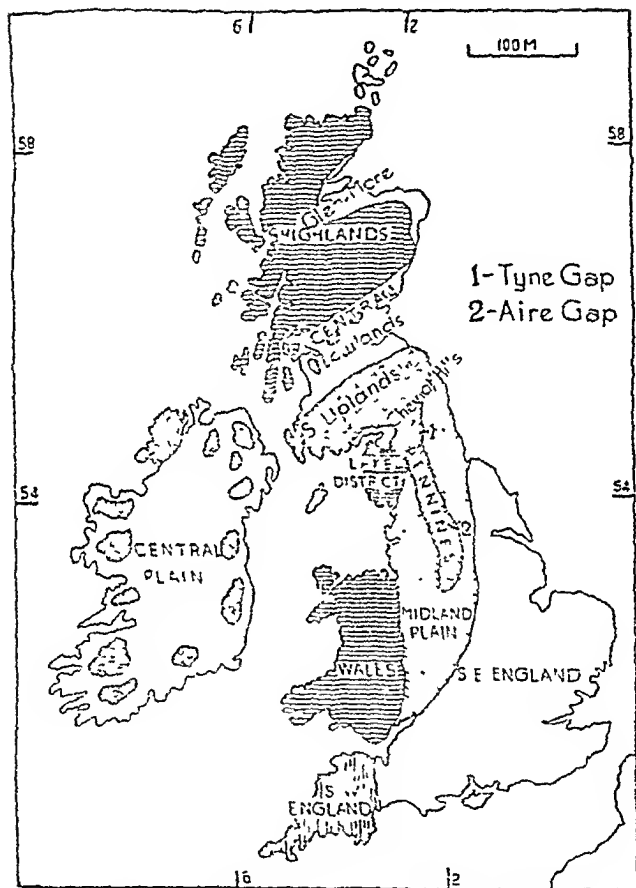


FIG 90 BUILD OF THE BRITISH ISLES (SIMPLIFIED)

The coastline is excessively broken and isle-studded, especially on the western shores. As a result, many sites are available for harbours, and in addition, no part of the British Isles is more than eighty miles from the sea. When all the natural advantages are considered, it is scarcely surprising that Britain has developed a maritime outlook.

Of the islands and island groups off our shores, the most noteworthy are the Shetlands (60.20 N. 1 15 W.), Orkneys (59.0 N. 3.0 W.), Outer and Inner Hebrides (57.0 N.-58.0 N. 7.0-8.0 W.), Isle of Man (54.14 N. 4.30 W.), Anglesey (53.17 N. 4.20 W.), Scilly Islands (49.55 N. 6.20 W.), Isle of Wight (50.40 N. 1.20 W.), and the Channel Islands (49.30 N. 2.20 W.). These last-named, which comprise Jersey, Guernsey, Alderney, and Sark, are nearer to the coast of France, but are politically a part of the British Isles. They are developing at the present time as holiday resorts.

The broken nature of the coastline gives rise to many openings, the positions of which should be noted. The most important are the Firth of Clyde (55.35 N. 5.0 W.), Solway Firth (54.50 N. 3.30 W.), Cardigan Bay (52.30 N. 4.30 W.), Bristol Channel (51.20 N. 4.0 W.), Loch Foyle (55.5 N. 7.7 W.), Belfast Lough (54.40 N. 5.50 W.), Donegal Bay (54.35 N. 8.40 W.), Galway Bay (53.12 N. 9.15 W.), The Wash (53.0 N. 0.20 E.), Firth of Forth (56.8 N. 2.40 W.), and Moray Firth (57.45 N. 3.40 W.).

C. Physical Features

In spite of its small area, the British Isles possess great variations in physical features, a simple classification of which is shown in Fig. 90.

1. THE HIGHLANDS OF SCOTLAND

These highlands comprise most of Scotland north of a line drawn from the mouth of the Clyde to Aberdeen (57.9 N. 2.6 W.), and leave but a narrow coastal plain along the east. Much of the surface possesses but little soil. Between Moray Firth and the Firth of Lorne lies Glen More, a valley which contains a string of lochs of which Loch Ness is an example. A canal has been constructed through this routeway, and gives communication

for small vessels between the North Sea and the Atlantic. Proposals have been put forward at various times for the widening of this canal through Glen More, to eliminate the necessity for large ships to undertake the dangerous stormy passage round the rock-bound northern coasts. It has, however, been considered that the volume of shipping using this route does not merit the reconstruction of the canal, and the propositions have been shelved.

Towards the south of Glen More lie high mountains, lochs, and river valleys in close proximity, and the whole thus forms the type of scenery popular with the tourist. Note the position of Ben Nevis (56 50 N. 5 0 W.), the highest mountain in the British Isles, Loch Lomond (56 6 N. 4 37 W.), and the rivers Spey, Dee, and Tay.

2 THE CENTRAL LOWLANDS

This area stretches from the Highlands in the north to the Southern Uplands in the south. Most of the lowland area of Scotland lies in this central valley, but it is not an extensive plain, for it is broken by hill groups such as the Sidlaws (56 30 N. 3 10 W.), Ochils (56 17 N. 3 40 W.), Campsie (56 1 N. 4 13 W.), and Renfrews (55 50 N. 4 30 W.). Much of the low-lying region between these hills is taken up by the basins of rivers, of which the Tay, Forth, and Clyde are noteworthy. These rivers open out into estuaries known as firths, which cut deeply into the country and give the central towns ease of access to the sea.

3 THE SOUTHERN UPLANDS

This area, with which may be grouped the Cheviot Hills to the south, is less mountainous and the hills are more smoothly rounded than the highlands to the north. As a result, the soil has not been swept off the uplands and there is sufficient to support the growth of grass. Through this region flow many rivers, the chief of which are the Clyde and Tweed.

4. THE LAKE DISTRICT

The Lake District consists of a central core of mountains and lakes, bordered with plainland such as the Solway

plain, the Irish Sea coastal plain, and the Eden valley. Here, as in North Scotland, the combination of mountains and lakes, the chief of which are Windermere, Ullswater, and Derwentwater, form scenes of natural beauty which attract large numbers of tourists annually.

5. THE PENNINE CHAIN

This chain, which stretches from the Cheviots (55 20 N. 2.35 W.) in the north to the Peak of Derbyshire (53 23 N. 1.50 W.) in the south, is formed of old hard rocks from which much of the soil has been removed. The rolling territory is very similar to that of the southern uplands of Scotland. As a watershed, the Pennines are important, for they give rise to many large rivers flowing to east and west. Notice carefully the position of the Tyne, Wear, Tees, Ouse, Aire, Don, Ribble, and Mersey. The River Trent flows mainly through the plainland to the south and east of the Pennines, but possesses tributaries within the highland group.

The headstreams of some of the eastward and westward flowing streams often lie within a few miles of each other, and by following such river valleys from east to west, communication across the Pennines is relatively easy. Notice particularly the position of the Tyne and Aire Gaps. It is interesting to note that it is on the margins of the Pennines, where the hills give way to the plain, that England's main coal-fields are situated.

6. THE MIDLAND PLAIN

Around the Pennines is grouped a series of plains and low hills known collectively as the Midland plain. This plain comprises extensive areas in Lancashire, Cheshire, Staffordshire, Shropshire, Hereford, Worcester, Warwick, Leicestershire, Derby, Nottingham, and Yorkshire. This region is not uniform, for it includes (a) infertile, hilly tracts such as the South Shropshire Hills and Malvern Hills (52.4 N. 2.24 W.), Cannock Chase (52 40 N. 2 1 W.), Charnwood Forest (52 40 N. 1.25 W.), Clent Hills (52 20 N. 2 0 W.), and the Forest of Arden (52.20 N. 1 40 W.); and (b) fertile plainland, such as the Lancashire and Cheshire plains, the Lower Severn basin in Gloucester and Worcester, the Avon

basin (or Vale of Evesham), the Trent basin, and Vale of York. Notice the position of the rivers Trent, Avon, and Severn.

7 SOUTH-EASTERN ENGLAND

This region, which comprises the rest of England, with the exception of Devon and Cornwall, is built up on low, roughly parallel hills and ridges of limestone or chalk with intervening clay valleys. These hills, which run generally from north-east to south-west, have a fairly steep western slope and a more gradual eastern slope, and are thus referred to as "scarplands."

The limestone escarpment is evidenced by Portland Bill in Dorset, the Cotswold Hills, the Northampton Uplands, the Lincoln Edge, and the North York Moors and Cleveland Hills.

Towards the east of these limestone hills, the land sinks down to clay valleys, which are in some cases covered by river and sea deposits. Examples of these vales are the Oxford Clay Vale, the Fenland, and the Vale of Pickering.

The chalk scarplands cover a more extensive area. For example, the Hampshire Downs and Salisbury Plain, which are of this formation, cover large tracts of Wiltshire and Hampshire. With this region as a starting place, the chalk scarpland can be followed west to the Dorset Heights, south-east to the North and South Downs respectively, and north-east to the White Horse Hills, Chiltern Hills, East Anglian Ridge, Norfolk Heights, and the Wolds of Lincolnshire and Yorkshire.

Between the North and South Downs of Kent, Surrey, and Sussex are fertile clay valleys and also a hilly region of infertile soil (the Forest Ridges). The whole is referred to as the Weald. The North and South Downs continue to the sea, which they overlook at Dover and Beachy Head. The lowland vales between the Downs and the Forest ridges include the Vale of Kent, Vale of Sussex, and the Romney Marshes (51° 0' N 0° 50' E).

Elsewhere, the seaward side of the chalk escarpment is characterized by a region of mixed, usually fertile, soils. The Hampshire basin, the lower Thames valley, which is

usually termed the London basin, East Anglia, and the coastlands of Lincolnshire and Yorkshire, belong to this type.

The sea-lands act as watersheds for many rivers. Rising in the limestone escarpment are the Witham, Nen, Ouse, and Thames, while from the chalk scarps flow the Cam, many smaller rivers such as the Wensum, Waveney, Stour, and Colne in East Anglia, the Kennet of the Thames valley and the Itchen, Test, and Avon of the Hampshire basin.

In the Weald, it is not the chalk escarpment which forms the main watershed, but the Forest Ridges in which rise the Mole, the Medway, and the Sussex Ouse. In their course these rivers have cut important gaps in the North and South Downs. Note the position of the Dorking Gap (51.14 N. 1.20 W.), cut by the Mole, the Medway Gap (51.17 N. 0.32 E.), and the Ouse Gap (50.52 N. 0.1 E.). Towards the west of the region lies the Guildford Gap (51.14 N. 0.34 W.) cut by the Wey, a river which rises in the Hampshire Downs.

The course of the Thames should be carefully noticed. This river rises in the Cotswolds and flows down the limestone scarp into the Oxford Clay Vale, where it receives many tributaries. Then, unlike most of the rivers which flow into the clay vale, the Thames cuts across the chalk escarpment, and in so doing has carved the Reading Gap (51.28 N. 1.0 W.) between the Chilterns and the White Horse Hills. From here the Thames pursues a winding course through the London basin.

The Bristol Avon, which also rises in the Cotswolds, is unusual in that it flows down the eastern slopes of the limestone escarpment, turns south and eventually pursues its course in a westerly direction through the scarp before flowing out into the Bristol Channel.

S. SOUTH-WESTERN ENGLAND

The highlands of Devon and Cornwall, composed largely of granite, are divided into three main groups: Exmoor, Dartmoor, and the moors of Cornwall. In this last group Bodmin Moor is outstanding. The moors themselves are bleak and infertile, but in lowland areas and in the river

valleys the soil is deep and fertile, and as a result, it is rich farming country particularly suitable for cattle.

9. WALES

Over most of Wales the physical features are similar to those found in the highlands of Scotland. Round the coasts there is a narrow coastal plain, and towards the south occur younger rocks which give rise to the South Wales coal-field. Note the courses taken by the Dee and Severn.

10. IRELAND

Ireland is formed of a badly drained central plain surrounded by mountain groups, such as those of Kerry, Knockmealdown, Wicklow, Mourne, Antrim, Donegal, Mayo, and Connemara. The poor drainage of the central plain has resulted in the development of the loughs, which are often joined up by sluggish meandering streams such as the Shannon.

In the east and north, the mountain rim is broken by a series of river basins, the chief of which are those of the Foyle, Bann (notice the position of Lough Neagh), Lagan, and Liffey

D. Climate

The British Isles are situated in temperate latitudes, a factor which, combined with their oceanic position and the existence of the North Atlantic Drift, results in mild climate conditions. In dealing with the climate of Europe, we stressed the moderating influence of the sea; and this effect of the ocean is even more definitely marked in the case of the British Isles. In winter, for example, the western coasts are warmer than the east, and the isotherms thus run north and south. The January isotherm of 40° F., for example, runs down the west coast of Scotland, the Irish Sea, through Wales and the Isle of Wight.

During the summer, on the other hand, the sun is overhead near the Northern Tropic, and since this influence is greater than that of the sea, temperature decreases from south to north. In other words, the isotherms run east-west.

The influence of the sea is, however, still discernible during the summer season, for the sea is cool compared with the land, and thus the isotherms for this season bend southward over the sea and northward over the land

From the sketch map it will be seen that the region with

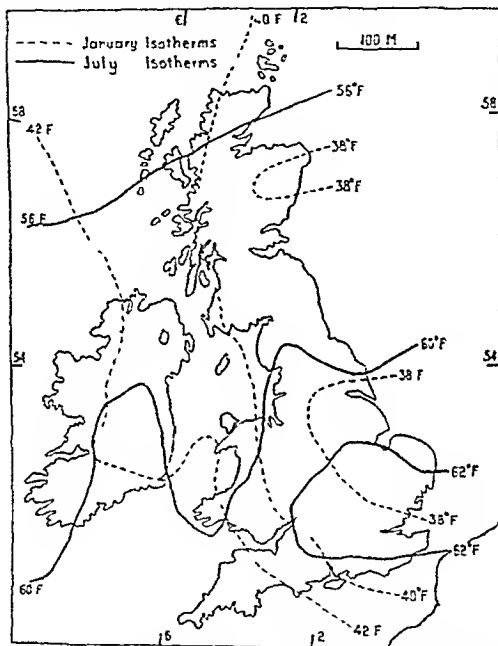


FIG 92 TEMPERATURE CONDITIONS OF THE BRITISH ISLES

the least range is in the north-west of the British Isles, while the south-east quadrant experiences the greatest extremes

The rainfall of the British Isles results mainly from the rain-bearing westerly winds and "depressions"; and is well distributed throughout the year. In crossing the British Isles, these rain-bearing winds encounter the mountains

A comparison of figures showing production and export of coal in the months of January-March 1947 and 1948 indicate the progressive improvement in the coal industry.

January-March	1947	1948
Production	11,725,000	12,120,000
Export	320,000	523,000

The position of the chief coal fields has been dealt with, and this explanation, together with that of the production and distribution of iron ore, should be carefully revised (Chapter V)

The other metallic wealth of the British Isles is relatively unimportant. Tin and copper are mined in small quantities in Cornwall, while some lead is obtained from Derbyshire and the southern uplands of Scotland.

The non-metallic minerals are more diverse in nature, and much more widely scattered. Building stones and road-making materials can be obtained from a variety of sources, the chief of which are the granite areas of Aberdeen and Cumberland while limestone can be obtained from any part of the limestone escarpment. Portland and Bath are, however, the chief centres for production of this stone.

The heavy clay of the clay vales can be used in brick-making, and industries of this type have developed at Peterborough (52° 36' N. 0° 16' W.) and Whittlesea (52° 33' N. 0° 5' W.).

In South-eastern England chalk derived from the chalk escarpment is turned into cement, especially in the lower Medway valley in North Kent.

Clay of a much finer type than that used for brick-making is the "Kaolin" which is used in pottery manufacture. Kaolin, which results from decay of granite, is mined in Devon and Cornwall, especially round St Austell (50° 20' N. 4° 46' W.), and is sent to the pottery district of North Staffordshire.

The quarrying of slates was at one time important in North Wales, Devon, and Cornwall but this activity is now of little importance. Oil shales are worked in the central valley of Scotland, chiefly in West Lothian (56° 0' N. 3° 40' W.), and a considerable quantity of oil is extracted. Geologists

are hopeful of finding oil wells in Southern England, and shafts have been sunk to great depths in various places, so far with but little success.

Mining for salt is one of the oldest of Britain's mining industries, and is still important. Cheshire is the chief region of production, and Northwich (53.16 N. 2.29 W.), Middlewich (53.12 N. 2.27 W.), and Nantwich (53.4 N. 2.31 W.) are the chief centres. As a result of the removal of the salt deposits, subsidence of the surface takes place, and the rickety appearance of many buildings in the salt-producing area is the direct result. Elsewhere, salt is mined in smaller quantities in the lower Tees valley.

F. Agriculture

Agriculture in the British Isles is one of the leading occupations, for out of a total male working population of fifteen millions, more than one million are so employed.

I. SCOTLAND

The nature and the amount of crops grown vary considerably with position, physical features, and climatic characteristics. In the northern highlands of Scotland, for example, the climate is harsh and the land is wind-swept and practically devoid of soil. Thus it is fit only for rough grazing; and the tending of sheep and deer, with grouse shooting, are activities which reflect the fact that arable agriculture is extremely difficult. In the river valleys a few crops such as oats and turnips are grown, and the highland farmer, or crofter as he is known, can usually manage to produce sufficient to sustain himself and his family. The poverty of the region has encouraged man here to turn to the sea as an additional means of livelihood, and fishing is engaged in off the coast. In spite of this extra activity, the northern highlands are but scantily peopled.

Along the coastal regions round the Moray Firth, the more sheltered situation and deeper soils allow the cultivation of fodder crops, oats, barley, and a little wheat; while, in addition, beef cattle are kept.

It is in the central valley of Scotland that agriculture is most important, and here, too, is a clearly marked example of the control exercised by climate. The western part of the central valley, lying directly in the path of the westerly winds, experiences a rainfall of 40-60 inches, and thus a large proportion of the land is given over to grass, the keeping of cattle and the production of dairy produce. Towards the east, the rainfall decreases and much of this area has under 30 inches annually, a figure which allows the growth of cereal crops such as oats, wheat, and barley. The Carse of Gowrie (56° 25' N. 3° 15' W.), which lies between the Sidlaw Hills and the Firth of Tay, is famous for its production of soft fruits as a result of which Dundee has developed a jam-making industry.

2 THE SOUTHERN UPLANDS

The southern uplands region is clothed with rough hill pastures, and sheep-farming is the general rule. In fertile sheltered spots, such as the Tweed valley and the eastern coastland cereals and root crops are grown, while in the river valleys and lowlands to the wetter west, such as those to the south of Kirkeudbright (54° 50' N. 4° 2' W.) and Wigtown (54° 52' N. 4° 27' W.), dairy farming and the growing of fodder crops is of chief importance.

3 ENGLAND AND WALES

Throughout England and Wales, the distribution of agricultural activities follows the same principles as those discussed in connexion with Scotland. The highland regions, chief of which are the Pennines and the Welsh mountains, are unimportant agriculturally, for, like the southern uplands of Scotland, they can support but scanty hill pastures, and thus the sparse population consists mainly of sheep farmers.

Intensive agriculture, rotation of crops, and mixed farming are characteristic of much of the remainder of England and Wales. The growing of cereals, root crops, beef, and dairy products is thus widespread, but differences in climate and soil conditions cause some productions to be of particular importance in certain areas.

(a) *Wheat*. This crop cannot be grown in any considerable quantity where the rainfall is greater than 30 inches, and since a warm summer and high sunshine are necessary, wheat cultivation is concentrated in the south-eastern quadrant of England and Wales. East Anglia is the most important region of production, for here exist all the natural conditions suitable for wheat such as low rainfall, high summer temperatures and sunshine figures, undulating land, and well-mixed fertile soils. The wheat grown is of high quality, and a considerable proportion of the home crop is used in the manufacture of biscuits (Reading is well known in this connexion), and for mixing with imported foreign wheats.

(b) *Barley*. This crop, like wheat, prefers dry conditions, but it can take advantage for ripening purposes of the longer days of sunlight towards the north, and can thus be grown along the eastern coastlands of Scotland. In Ireland the necessity for dry conditions restricts the production of barley to the south-east corner near Wexford (52° 20' N. 6° 27' W.). In both Scotland and Ireland the product is used mainly in the distillation of whisky; while in England malt, used in the preparation of beer, is one of the products derived from this cereal.

(c) *Oats*. Oats can stand drier and moister climatic conditions than wheat, and can be grown on less fertile soils than wheat demands. This crop is, therefore, widely distributed, and is of great importance where it is impossible to grow the more usual arable crops. In the wetter west and hilly regions of Scotland, oats occupy about one-half the arable land; and in Wales, Cumberland, Westmorland, Lancashire, and Cheshire between one-quarter and one-third.

(d) *Beans and Peas*. The cultivation of beans and peas is important as a fodder crop in the mixed-farming regions of East Anglia and the Fenland.

(e) *Potatoes*. These are grown both as animal and as human food. In England and Wales they are grown mainly for local markets. In the Fenland areas of Ely (52° 30' N. 0° 5' E.), and Cambridge (52° 15' N. 0° 10' E.), and in Holland (52° 50' N. 0° 0'), Lincolnshire, cultivation of potatoes takes

up more than one-quarter of the arable land. Much of the crop is sent by rail to the London markets.

In the plains of Lancashire and South Durham, large quantities are grown and sent to the industrial towns near by, while much of the crop is fed to cattle and pigs on the farms.

In Scotland the growing of potatoes is widespread, and in the poorer regions the potato forms a valuable additional item of diet for both man and beast.

In the Irish Free State, more than one-quarter of the arable land is given over to potato cultivation, and of this large production roughly equal quantities are used for human food and for animal food.

(f) *Turnips and Swedes*. These root crops, which are used as a winter food for animals, are grown widely, but the chief concentration is to be found in the potato-producing areas and in East Anglia.

(g) *Sugar Beet*. The growing of sugar beet, fostered by Government subsidy, is concentrated in East Anglia, where the deep-mixed fertile soils are, in fact, suitable for all root crops. Factories have been erected in this region to extract the sugar from beet, and King's Lynn (52° 46' N. 0° 25' E.), Ely, and Bury St Edmunds (52° 15' N. 0° 40' E.) have become important in this connexion.

1947 ACREAGE FIGURES

Wheat	2 075,000
Oats	1,961,000
Barley	1,879,000
Potatoes	941,000
Mixed corn	488,000
Sugar Beet	362,000
Rye	32,000

(h) *Market Gardening*. The chief requirements for market gardening are that the soil shall be deep and rich, and that good markets shall be easy of access. As a result of the demands for market garden produce by the inhabitants of our large cities, this industry has developed around most of them. The approaches from Essex and Hertford to London, for example, are marked by acres upon acres of market gardens and glass-houses, all producing requirements for the huge London market.

Even farther afield are regions similarly engaged. A deep rich soil is to be found in the Fenland, especially round Wisbech (52.40 N. 0.4 E.), Ely, and Bedford (52.8 N. 0.30 W.); and much of this area produces vegetables, flowers, and soft fruits (strawberries, gooseberries, and currants). Much of this produce goes to London.

In Kent, on the northern side of the North Downs, is another region of mixed fertile soils, within easy reach of the great London market, and this area is thus also important for market gardening.

Cornwall and the Scilly Isles are important producers of garden produce in spite of the fact that they are at a comparatively great distance from any large market. The climatic factor is here responsible, for the modifying influence of the sea in winter enables potatoes, vegetables, and flowers to develop earlier here than in other parts of the country. Since the produce of this region can be marketed early, it can command a good price, especially in the London market, and can therefore stand the cost of transport.

Hops, grown for use with malt in the preparation of beer, are grown largely in the world region, especially of Kent. This county is also famous for its orchards of apples, plums, and pears. Elsewhere in the British Isles, fruit cultivation of this type is important in the Fenland, the lower Severn counties of Hereford, Worcester, and Gloucester, and in Devon and Somerset.

(i) *Flax*. Flax was at one time grown in the eastern half of the central valley of Scotland, but this production has decreased, and the chief areas for flax are now in lowland areas of Northern Ireland, especially in the basins of the Foyle, Bann, and Lagan.

(j) *Sheep and Cattle*. Sheep and cattle are kept throughout the arable lowlands as part of the mixed farming scheme, but are also important in certain other regions. The rough mountain pastures of Wales, the Lake District, and the Pennines, the uplands and highlands of Scotland, and the mountains of Wicklow and Galway in Ireland, are all regions where the soil and climatic conditions are more suitable for sheep rearing than for arable farming.

In England and Wales, which possess 60 per cent of the sheep flocks of the British Isles, other areas important for sheep farming are the limestone and chalk escarpments, together with the Romney Marsh region of Kent.

It is interesting to notice that in Cumberland, Wales, and Scotland, there is a seasonal migration of sheep and shepherds to the hills in summer and to the plains and valleys in winter.

(1) *Cattle* Of the total cattle in the British Isles, half are beef and half dairy cattle. The chief concentration of cattle is found on the moist western lowlands of the British Isles, where the climate and soil conditions produce thick luscious grass growth so suitable for cattle.

In Scotland, beef cattle are to be found around the Moray Firth, and dairy cattle are concentrated in the western side of the central lowlands and in the counties to the south-west of the southern uplands. Ayrshire produces large quantities of milk for industrial towns such as Kilmarnock (55 37 N 4 29 W), Glasgow (55 53 N 4 17 W), Motherwell (55 47 N 4 0 W), and Wishaw (55 17 N 3 55 W), while Kirkcubright and Wigtown send milk, cream, butter, and cheese to these towns, and to many of the northern towns and industrial centres of England.

The plains of Lancashire and Cheshire comprise perhaps the most important dairy-farming region of the British Isles, and from here the produce, most of which is in the form of milk is sent to the great industrial centres of Lancashire, Yorkshire, the Midlands, and to London.

Throughout the Midlands there are large numbers of cattle, but here beef production is more important than dairying. As a result of the numbers of cattle kept in this region, Leicester (52 38 N 1 7 W.) and Northampton (52 14 N. 0 56 W) have developed leather industries.

The south-western counties of Somerset and Devon are dairying regions, and much of the dairy produce, such as cream from Devonshire or milk from the plain of Somerset, is sent to London. Cornwall has large numbers of beef cattle. The existence of the large market of London has encouraged the development of dairy farming in South Essex.

The lowland region of Pembrokeshire, in South-west

Wales, has numbers of beef and dairy cattle, and supplies the industrial population of the South Wales coal-field.

Much of Ireland is low-lying, and since it has a heavy rainfall, it is only in sheltered regions that arable agriculture can be carried on. Over much of this country the keeping of cattle is important, and live cattle, meat, milk, and butter are exported from Belfast, Dublin, Cork (51.55 N. 8 27 W.), and Waterford (52.15 N. 7 8 W.). In addition, pigs and poultry are kept, and there is a considerable export of bacon and eggs. Much of this export of meat and dairy produce goes to the industrial regions of Lancashire, but the political differences which arose between Eire and England caused this trade to decrease prior to 1939. Since 1945, however, trade contacts have been re-established.

G. Fishing

The fishing industries of the British employ some 80,000 men. The fish caught vary from pelagic, such as herring, pilchard, and mackerel, which live near the surface and occur in shoals to demersal, such as plaice, sole, cod, and haddock, which feed on the bottom. This difference in nature of the fish results in the use of different methods of fishing, for pelagic fish can be caught by drift nets, whereas for demersal, trawls are used. Of the total number of fish landed by British fishermen, more than 70 per cent are caught by this latter method.

The main fishing grounds are to be found in the North Sea, where the Dogger Bank is an important centre, the English Channel and the south-western coasts of the British Isles; off the west coast of Scotland; and around Iceland.

Originally the fishing industry depended upon small sailing craft which used to land the fish at the nearest available port. The development of the steam trawler has made it possible for fish to be landed, not necessarily at the nearest port, but at centres which have fast railway communication with the centres of consumption. This tendency towards "centralization" is further aided by the use of fast carriers, which bring in fish to the port from the fishing fleet, which is thus enabled to remain at sea for

considerably longer periods than heretofore. As a result of these changes, many of the smaller ports have lost much of their trade to such great ports as Aberdeen, Grimsby (53° 35' N. 0° 4' W.), Hull (53° 44' N. 0° 21' W.), Yarmouth (52° 38' N. 1° 43' E), Lowestoft (52° 30' N. 1° 45' E), and Fleet-

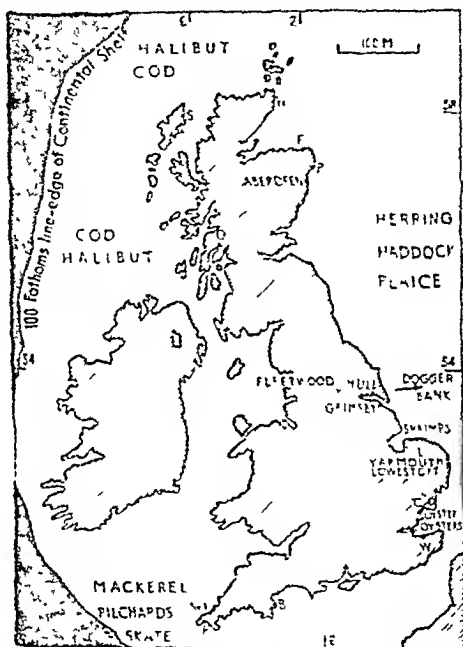


FIG 94 FISHING GROUNDS AND PORTS OF THE BRITISH ISLES
Identify each of the ports indicated by initials

wood (53° 56' N. 3° 0' W.), all of which have excellent rail communication inland. The position of the smaller ports should also, however, be noted in subsequent reading.

The North Sea is the most important region for herring fishing. Since these fish spawn earlier in the north than in the south, fishing begins in June off the north-east coast

of Scotland and at later dates more to the south (October at Yarmouth). Thus the fish do not move south throughout the fishing season, but the fishing fleets do, together with the Scottish fishing lassies, whose job it is to help cure the fish brought into the ports.

Since many of the herrings are destined for curing and re-export to Mediterranean lands, there is not the same urgent need for rapid transport of the fish once it is landed, and the Scottish fishing ports of Fraserburgh (57.41 N. 2.0 W.), Peterhead (57.30 N. 1.47 W.), and Wick (58.26 N. 3.6 W.) are still important centres.

Apart from herrings, other fish caught in considerable quantities in the North Sea include haddock and plaice.

Off the western coasts of Scotland and the banks of Iceland, cod and halibut are more important, and while much of the catch is brought to Fleetwood or Aberdeen, some is still landed at Lerwick (60.10 N. 1.10 W.) in the Shetlands, Stornoway (58.13 N. 5.22 W.), and Oban (56.25 N. 5.29 W.).

In the English Channel and off the south-western coasts mackerel, pilchards, and skate are the main fish caught, and in South-western England are found many little fishing towns, of which Brixham (50.23 N. 3.31 W.), Penzance (50.7 N. 5.33 W.), and St Ives (50.12 N. 5.30 W.) are examples. Along the western and south-western coasts of Ireland may be found a similar distribution of small fishing hamlets.

Other fish products are of interest rather than importance. For example, oysters are farmed on either side of the Thames estuary in the mud flats of Whitstable (51.26 N. 1.1 E.) and Colchester (51.51 N. 0.56 E.), while shrimps are caught in the Wash and landed at King's Lynn and smaller towns along the north-western coasts of Norfolk.

II. Industries

For industrial activity the British Isles are fortunately placed, since they possess power resources in the form of coal, a good central position which encourages the development of shipping and overseas trade, and efficient labour. A further advantage, and one which gave the British Isles

a start as an industrial nation, is the fact that it was in Britain that many of the inventions upon which industry is based, such as the use of steam power and the spinning jenny, were made

1. COTTON MANUFACTURE

The manufacture of cotton was at one time the chief

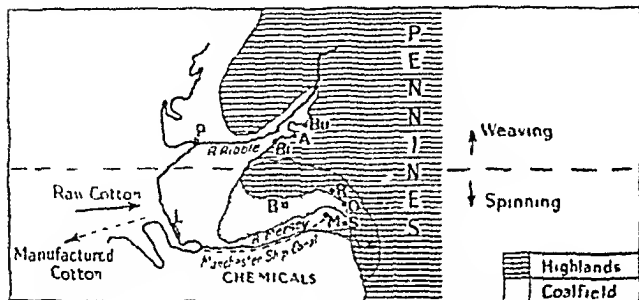


FIG 95 THE LANCASHIRE COTTON INDUSTRY

Identify each of the towns indicated by initials

industry of the British Isles, and more than half the world's output of spun cotton and cotton goods came from this source

The main cotton industry is centred in Lancashire to the south of the Ribble, and in the Clyde-mouth region of Scotland.

Cotton manufacture in Lancashire was the result of a fortunate combination of factors. Power in the early days resulted from the Pennine streams, and since the water from this source is soft in nature, it was of great use in the cleansing and bleaching processes.

Further, cotton spinning demands a humid atmosphere, and the position of Lancashire, to the west of the Pennines, gives the region an annual rainfall of about 50 inches and the requisite moist air conditions.

Towards the south are found the salt deposits of Cheshire and South Lancashire, and from them are derived the chemicals needed for bleaching and dyeing processes. The

development of a new textile industry demanded a supply of labour skilled in the intricate processes of manufacture, and Lancashire was indeed fortunate in this respect. From Yorkshire she drew labour skilled in woollen manufacture, but a great fillip to her development was given by the influx of skilled Flemish textile workers, who fled from their own country owing to religious persecution.

The development of steam power helped Lancashire to consolidate her position still further, for she was found to possess an extensive coal-field. Again, Lancashire faces the Atlantic and America, and it is from South-eastern U.S.A. that she obtains much of her supply of raw material.

In Lancashire the industrial region is divided into two by the Rossendale Forest. To the south, around the head-streams and tributaries of the Mersey, are situated the spinning towns of which Bolton (53.35 N. 2° 25' W.), Rochdale (53° 37' N. 2° 8' W.), Oldham (53.33 N. 2° 6' W.), and Stockport (53.25 N. 2° 8' W.) are the chief, while in the Ribble valley of the North are found the weaving centres such as Blackburn (53° 45' N. 2.28 W.), Preston (53° 47' N. 2.42 W.), Acerington (53° 46' N. 2° 22' W.), and Burnley (53° 47' N. 2.15 W.).

From the coast to these towns, railway communication is easy, and this advantage of easy transport has been further increased by the building of the Manchester Ship Canal. By this means, ocean-going vessels can come up as far as Manchester, which has become the collecting and distributing centre of the whole region.

The lower Clyde region, which derives its power from the Lanarkshire coal-field, also possesses cotton manufactures, the chief of which are situated in Glasgow and Paisley (55.52 N. 4.27 W.). The production of cotton thread and shawls is of note in this last-mentioned town.

In Nottingham (52° 57' N. 1° 8' W.), Leicester, and near-by towns the cotton industry is also carried on, but of a different type from that of the regions already discussed. Here the climate is too dry for spinning, and the costs of the transport of raw materials would also be considerable. Since this is the case, these towns "import" spun cotton from Lancashire and specialize in "open work" articles.

e.g. cotton lace and hosiery, the cost of which depends almost entirely on the amount of labour spent on them, and not on the amount or value of the raw materials

After the first world war, the cotton industry of the British Isles slumped badly, as evidence of which it may be stated that in 1924 Lancashire possessed 40 per cent of the world's spindles, whereas in 1936 the figure was only 30 per cent. To understand this we must look abroad, for much of the manufactured cloth is exported, and the loss of foreign markets resulted in the closing of many Lancashire mills. In the first place, many former markets such as Brazil, Canada, India, Russia, and Chile, manufactured much of their own cotton and secondly Japan was flooding the Asian markets with cotton at such low prices that Lancashire could not compete.

2 THE WOOLLEN INDUSTRY

The woollen industry is of earlier origin and more widespread distribution than that of cotton. Sheep were kept over considerable areas and there was a considerable export of raw wool, as well as a widely scattered home industry. Norfolk was at one time important in this connexion, and developed a specialized form of manufacture known as worsted. The village of Worstead, near Norwich (52° 38' N. 1° 18' E), stands as evidence of an industry which is now defunct.

Elsewhere many towns developed specialized forms of woollen manufacture, examples of which are still in evidence. In the West of England spinning has now ceased, but yarn is imported, and weaving and finishing of special types of cloth are engaged in. Stroud (51° 46' N. 2° 12' W.), for example, is important for broadcloth, Dursley (51° 41' N. 2° 11' W.) for woollens and carpets, Witney (51° 47' N. 1° 30' W.) for blankets, Frome (51° 14' N. 2° 19' W.) for serge, and Kidderminster (52° 23' N. 2° 15' W.) for carpets.

In the Midlands, the same towns which are engaged in "open work" cotton fabrics, viz. Leicester and Nottingham, are also important for woollen manufactures. The industry is, like the cotton, a highly specialized one, and is chiefly concerned with the manufacture of hosiery.

In the Tweed valley of Scotland, the proximity of native wool from the uplands and water power from the Tweed has resulted in the development of woollen manufactures. The chief production, which is the specialized make of cloth known as "tweeds," comes from the towns of Galashiels (55.37 N. 2.50 W.), Selkirk (55.32 N. 2.50 W.), and Hawick (55.25 N. 2.47 W.).

In spite of this widespread distribution, one region is

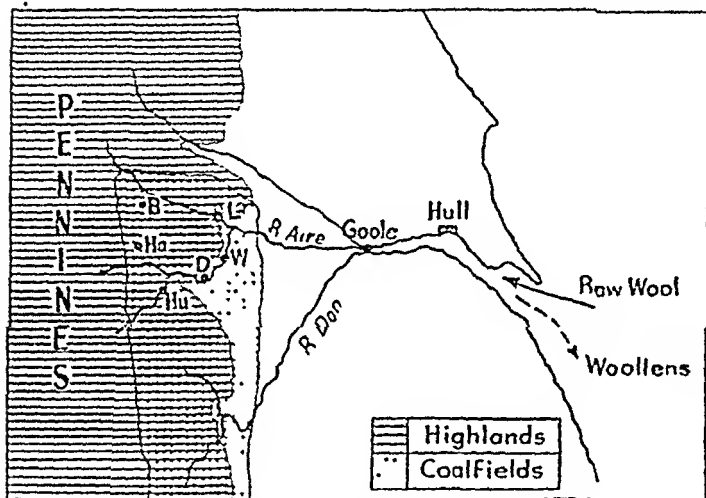


FIG 96 THE YORKSHIRE WOOLLEN INDUSTRY

Identify each of the towns indicated by initials

generally regarded as the woollen manufacturing region of England—the West Riding of Yorkshire. This viewpoint is natural, for this area contains more than 80 per cent of the woollen workers of England. The industry here developed early owing to the presence of sheep on the Pennines and running water, useful for power and washing, from the mountain streams.

With the employment of steam power, its position on the West Yorkshire coal-field consolidated the industry, and expansion necessitated the import of wool from Australia, New Zealand, South Africa, and Argentina,

mohair from Turkey, and alpaca wool from Peru. The necessity for transport of such raw materials inland to the West Riding area might have handicapped the industry but for the fact that there is good communication by means of the Humber, Aire, and Calder systems.

Within the region there is considerable specialization. Bradford (53 47 N 1 45 W.), for example, is engaged in the manufacture of worsteds, Halifax (53 43 N. 1 51 W.) in lighter worsteds for rugs and carpets, Dewsbury (53 42 N. 1 36 W.) in shoddy, and Huddersfield (53 40 N. 1 48 W.) and Wakefield (53 42 N 1 28 W) in general woollen goods. Leeds (53 48 N. 1 32 W.), which has a population of nearly half a million people, is not primarily engaged in woollen manufacture, but has important clothing and engineering works. In addition, it acts as the chief collecting and distributing centre for the whole of the region.

The import and export trade of the woollen manufacturing regions is handled by a variety of ports, the chief of which are Hull, Goole (53 43 N 0 52 W), Liverpool (53 26 N. 2 58 W), and, rather surprisingly, London and Southampton.

3 OTHER TEXTILE INDUSTRIES

The manufacture of silk, which is entirely dependent on imported raw material, is concentrated chiefly in Derbyshire, Staffordshire, Cheshire, and Leicestershire.

Power supplies are easily available from the coal-fields of Lancashire, Yorkshire, and the Midlands, and this industry has become very important in Macclesfield (53 13 N. 2 8 W.), Derby (52 54 N 1 27 W.), and Chesterfield (53 14 N. 1 26 W.), as well as in the towns surrounding Leicester. In the last-named towns the industry is connected with the manufacture of underwear and hosiery. Of more recent times the manufacture of artificial silk, which is dependent upon such raw materials as wood pulp and short stapled cotton, has also become of importance in these towns.

Linen manufacture grew up in the flax-growing regions such as the lowlands of Northern Ireland and the eastern end of the central lowlands of Scotland. As a result, Belfast (54.36 N. 5.56 W.) and Londonderry (55 0 N. 7 21 W.) in Ireland, and Dundee (56 28 N. 3 0 W) and

Kirkcaldy (56.7 N. 3.11 W.) in Scotland, have become important linen centres. The home production of flax in Scotland is now insufficient to feed her industry, and considerable quantities are imported, especially from the Baltic countries. In addition, hemp and jute manufactures have attached themselves to the linen centres of Scotland. For such industries, Dundee and Kirkcaldy can use coal from the Fife Midlothian field, whereas Belfast and Londonderry have to depend on imported coal, most of which comes from the Ayrshire field.

4. IRON AND STEEL MANUFACTURES

Under this heading is considered the manufacture of iron and steel, machinery, and ships.

In early days iron ore was often found in conjunction with coal or at least very near coal deposits, and where this happened, an iron and steel industry was established. These ores were, however, soon worked out, but the iron and steel industry, once established, remained on the coal-field, although the raw material now has to be brought from the iron-ore producing regions of Northamptonshire or Lincolnshire, or from foreign countries such as Sweden and Spain.

The Lanarkshire Area. The iron and steel industry was established here on local deposits of coal and iron ore, but the latter commodity is now imported. The Clyde waterway and railways provide good communication, and to-day the iron and steel industry is centred on Coatbridge (55.52 N. 4.2 W.), Airdrie (55.58 N. 4.1 W.), Motherwell, and Wishaw. Engineering and the manufacture of all types of heavy machinery is carried on, while nearer the estuary of the Clyde, Glasgow, and Dumbarton (55 57 N. 3 32 W.) engage in shipbuilding.

The Cumberland Area. Here the coal is found along the west coast, between the ports of Maryport (54 33 N. 3 30 W.), and Whitehaven (54 33 N. 3.35 W.), while high grade iron ore is found to the south, chiefly near Barrow-in-Furness (54 6 N. 3 11 W.). In this case the coal is moved from the coal-field to the iron ore region, and Barrow-in-Furness is engaged in shipbuilding—especially of submarines

The Northumberland-Durham Area From earliest days much of the coal from this coal-field has been exported, and the demand for ships to carry this coal was the original factor in the establishment of shipbuilding near this coal-field. Local supplies of iron ore were found in conjunction with the coal, and when this local supply was no longer

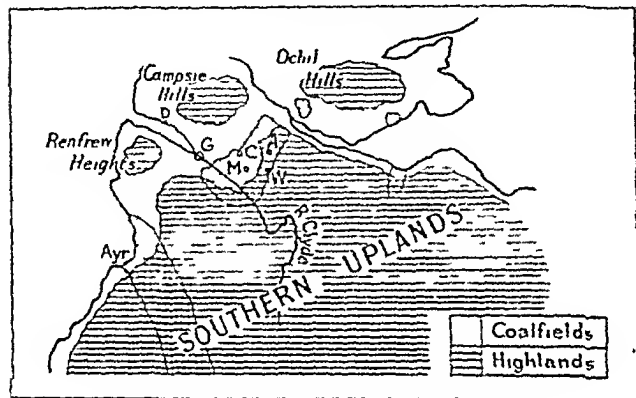


FIG 97 THE COAL-FIELDS OF SCOTLAND
Identify each of the industrial towns indicated by initials

workable, iron ore could easily be obtained from the Cleveland Hills, to the south of the Tees, or from abroad, when the coastal situation was a decided advantage. The shipyards also need deep well-sheltered water for launching the finished product, and thus shipbuilding is of importance round the mouth (a) of the Tyne ($55^{\circ} 0' N$ $1^{\circ} 27' W$), where Newcastle, Gateshead, Tynemouth, North and South Shields are so engaged, and (b) the Wear ($54^{\circ} 54' N$ $1^{\circ} 21' W$), where Sunderland is engaged in building smaller vessels.

Apart from shipbuilding and the export of coal, other industries are important in connexion with this coal-field.

Along the lower Tees is a region engaged in the manufacture of iron and steel and various engineering products. Much of the iron and steel produced is sent to other regions which are engaged in the manufacture of machinery.

In addition, Middlesbrough (54 34 N 1.13 W.) is engaged in shipbuilding, Darlington (54.32 N. 1.33 W.) in locomotive construction, while Stockton (54.34 N. 1 20 W.) also has heavy manufactures.

The South Yorkshire Area. A combination in early days of local supplies of iron ore, charcoal or coal, water-power

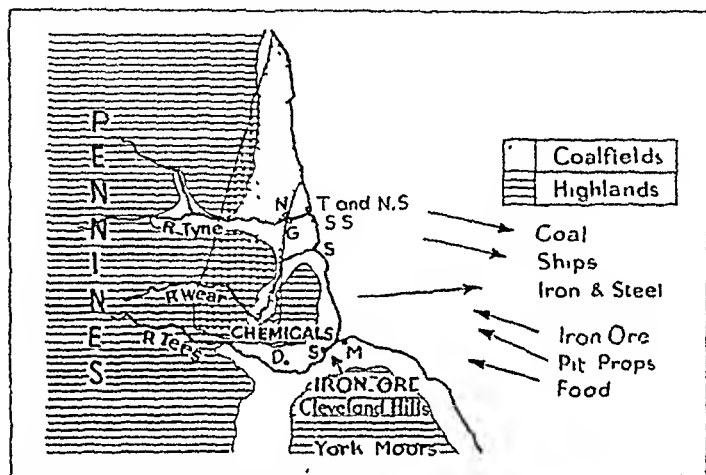


FIG 98. THE NORTHUMBERLAND-DURHAM COAL-FIELD AREA

Identify each of the industrial centres and/or ports indicated by initials

and millstone grit led to the development in the river valleys of the Skel and Upper Don of the manufacture of iron and steel goods, an activity which has since crystallized into the cutlery industry of Sheffield (53 24 N. 1 27 W.). A very high grade of iron is necessary for the high-class goods produced by Sheffield, and pure bar iron is now imported from Spain and Central Sweden. Sheffield is engaged in the manufacture of finished articles, and the smelting of iron ore and preparation of pig iron is no longer an activity engaged in in this neighbourhood. Doncaster (53 32 N. 1.8 W.) manufactures railway equipment, while Derby produces motor cars and aeroplane engines.

The Black Country. Of the small coal-fields in the

Midlands, the most important are those of Warwickshire and South Staffordshire. Local coal and iron ore were originally used in smelting and in the production of pig iron, but the best coals have now been worked out and there is also now no iron mining. As a result there has been a decline of pig iron manufacture, and foundry pig iron is now brought into the region from Northampton and the other iron- and steel-producing regions of England.

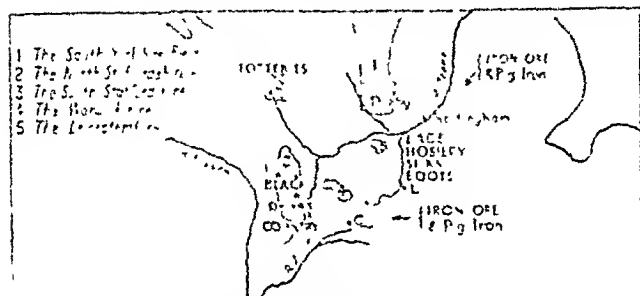


FIG. 99 COAL-FIELDS AND INDUSTRIAL AREAS IN THE MIDLANDS

Identify each of the industrial towns (indicated by initials) and note the industries associated with each.

The iron and steel industry of Warwickshire and South Staffordshire is not now concerned with the preparation of iron and steel as such, but with the manufacture of small valuable manufactured articles which demand a small supply of raw material but a great amount of labour. As a result, the character of the Black Country, a term which should be used with reference to the South Staffordshire area (52° 30' N. 2° 0' W.) only, has changed, for this unfortunate name was given to the area when smoke from the foundry chimneys covered the surrounding areas with soot and grime. At the present time, Coventry (52° 24' N. 1° 30' W.), situated just to the south of the Warwickshire field, produces cars, cycles, motor-cycles, and wireless sets, while Birmingham, West Bromwich, Walsall, Wolverhampton, Dudley, and Wednesbury, all in the "Black

Country," manufacture similar products, together with tools, electrical apparatus, and domestic appliances.

The South Wales Area. The South Wales coal-field, which is divided into two by Carmarthen Bay, produces very high-grade steam coals and anthracite, of which much is exported from Swansea (51 38 N. 3 56 W.), Newport (51 36 N. 3 0 W.), Cardiff (51 29 N. 3 9 W.), Llanelli (51 43 N. 4 14 W.), and Milford (51 45 N. 5 2 W.). More than nine-tenths of the export from the last-named town is used in coaling vessels. On the coal-field iron ore was also found, and the iron and steel industry originally grew up in the interior, especially around such towns as Merthyr (51.46 N. 3 21 W.) and Aberdare (51 43 N. 3.24 W.); but eventually the local supplies of ore were worked out, and the smelting industry was fed by imports from Spain, Russia, and Algeria. As a result the ports of Newport, Swansea, Cardiff, and Llanelli became the centres of the iron and steel industry, for here was the meeting place of coal—destined for export—and imported iron ore.

With the iron and steel industry of Swansea and Llanelli has become associated the tinplate industry. Much of the tin used in early days was brought from Cornwall, but now by far the greater proportion comes from the Malay States. Tin plates are exported from this region, and in addition South Wales manufactures household utensils and containers for such commodities as food, tobacco, and petroleum.

The Northampton and Lincolnshire Area. Of recent years workable quantities of iron ore have been found in the limestone escarpments of Northamptonshire and Lincolnshire, and although these areas are not on a coal-field, they have become iron-smelting regions. Coal is brought into the regions, especially from Barnsley (53 35 N. 1 27 W.) on the Yorkshire fields, and new works for the production of pig iron have developed at Frodingham (53 38 N. 0 40 W.), Scunthorpe (53 40 N. 0 40 W.), Kettering (52 24 N. 0 44 W.), and Corby (52 42 N. 0 35 W.). Much of the pig iron produced is sent to the old-established engineering centres on the coal-fields of Yorkshire, Staffordshire, and Scotland.

Other Centres. In South Lancashire the existence of coal,

the ease with which iron can be obtained, and a large market, have led to the development of the manufacture of textile machinery. This industry is shared by Rochdale, Bolton Salford (53 30 N. 2 17 W.), Manchester, and Wigan (53 33 N. 2 37 W.) Across the Irish Sea, Belfast, which possesses a good port, is engaged in shipbuilding, in spite of the fact that both coal and iron have to be imported. The industrial activities of this town provide a market for much of the coal exported from Ayr in Scotland, and Workington and Maryport in Cumberland.

In South-eastern England, there are also industries for which the raw materials and power have to be transported from the iron- and steel-producing regions on the coal-fields. Peterborough, Ipswich (52 4 N. 1 9 E.), Lincoln (53.14 N. 0 30 W.), and Norwich, for example, manufacture agricultural machinery. Swindon (51 34 N. 1 47 W.) possesses a locomotive works, and the area round London has miscellaneous industries, of which the manufacture of Ford cars at Dagenham may be quoted as an example.

5 CHEMICAL INDUSTRIES

The existence of the salt deposits of Cheshire, the ease with which material can be imported via the Manchester Ship Canal, and the existence of a large market near by in Lancashire have led to the development in South Lancashire and Cheshire of great chemical industries. Runcorn (53 19 N. 2 43 W.), Warrington (53 24 N. 2 34 W.), and Widnes (53 22 N. 2 44 W.) produce a great variety of chemicals, and in addition, St Helens (53 28 N. 2.43 W.) manufactures glassware, while soap is made at Warrington and Port Sunlight (53 19 N. 3 1 W.)

In the basin of the lower Tees, near the Northumberland and Durham coal-field, various salts are also found, and miscellaneous chemicals are manufactured along the river banks.

6 POTTERY MANUFACTURE

The manufacture of pottery is concentrated on the North Staffordshire coal-field (53 0 N. 2 10 W.), where, in the five towns of Stoke, Newcastle-under-Lyme, Hanley, Burslem

and Longton are found more than three-quarters of the pottery workers of the country. A raw material largely used is kaolin, much of which is brought from Devon and Cornwall

7 THE LEATHER INDUSTRY

This is a very old industry and grew up in various centres where a supply of cattle hides and oak bark—the latter a necessity for tanning—were easily available. Many of the market towns of South-eastern England thus developed leather-tanning industries, and the manufacture of boots and shoes, and of these Northampton, Leicester, and Norwich are the most important. At the present day, many hides are imported, and as a result London, which handles much of this trade, and possesses, in addition, a large market near by, is engaged in the production of leather goods.

8 DEVELOPMENT AREAS

The government is sponsoring industrial development in the depressed areas and particularly in Lanarkshire, Wigan, Wrexham and South Wales. The industries to be set up are of many types including the manufacture of glass, scientific instruments, prams, toys, plastics and retreading tyres.

I Distribution of Population

In Fig. 100 it is shown that the most heavily populated areas (over 512 per square mile) are those of the coal-fields and main industrial centres. The only exception to this statement is to be found in and around London.

A fairly dense population (between 64 and 512 per square mile) is found over most of the lowlands—regions which are suitable for arable farming and/or cattle rearing. A scanty population (under 64 per square mile) is to be found in the bleak, windswept, and inhospitable mountain regions

J. Communications

1. CANALS

While there are many canal systems in the British Isles, few have been able to withstand the competition of the

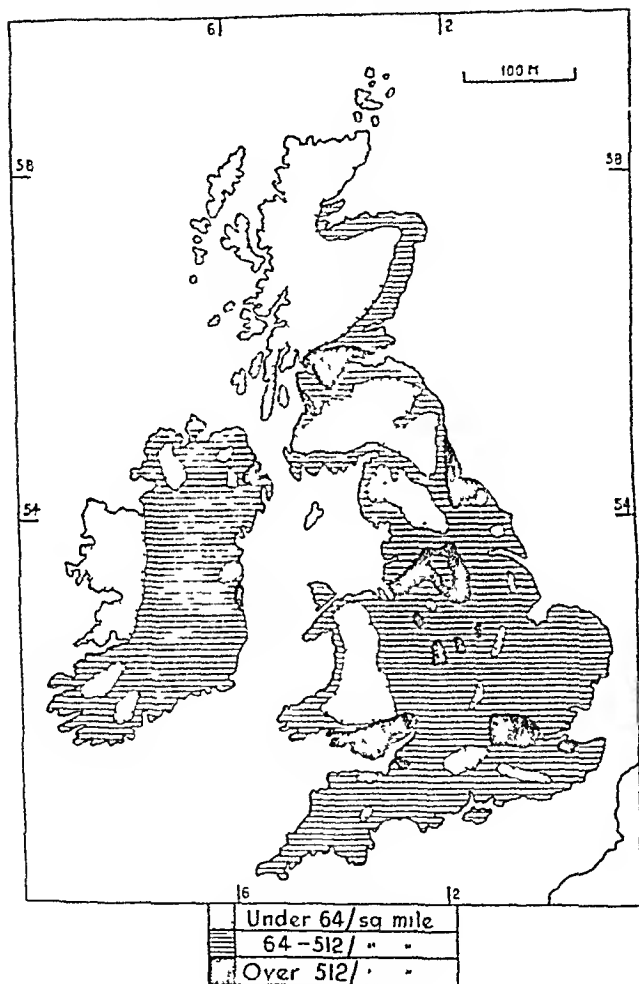


FIG 100 DENSITY OF POPULATION IN THE BRITISH ISLES

railways, but these few, which are of importance chiefly in connexion with the main industrial areas, are of value in the transport of heavy goods. First and foremost stands the *Manchester Ship Canal*, which has made Manchester a seaport, and allows heavy goods, among which raw cotton is important, to be brought almost into the centre of the Lancashire industrial area. In addition, heavy goods

- ① *Manchester Ship Canal*
- ② *Leeds and Liverpool Canal*
- ③ *Trent and Mersey Canal*
- ④ *Birmingham Canal*
- ⑤ *Grand Junction Canal*



FIG 101 CHIEF CANALS OF ENGLAND

Identify each of the industrial centres and ports (indicated by initials)
What commodities are moved along each of these canals?

intended for export can be loaded at Manchester, and thus railway freightage can be saved.

The connexion of Lancashire with the east coast is made by means of the *Leeds and Liverpool Canal*, which serves the weaving towns of Blackburn and Burnley, and crosses the Pennines by means of the Aire Gap to Leeds. From here the Aire, partly canalized, is navigable to the sea.

Farther to the south is found the *Trent and Mersey Canal*, which links up the Humber estuary, Nottingham, the North Staffordshire pottery centres, Cheshire, and the Manchester Ship Canal. It is by means of this canal that kaolin, which is shipped from Devon and Cornwall to the Mersey, is brought into the pottery centres.

The Midland and Black Country towns possess good canal communications with the sea, for the *Birmingham*

Canal gives communication with the Mersey, the *Grand Junction* meets the Thames at London, while other canal communications give this region outlets via the Humber and the Severn

In Scotland, the *Forth and Clyde Canal*, which connects Glasgow and Grangemouth ($56^{\circ} 2' \text{ N } 3^{\circ} 45' \text{ W}$), is useful for the transport of heavy commodities in an east-west direction but its importance would be much greater if it were large enough to allow the passage of ocean-going vessels

2 RAILWAYS

Much of the British Isles is covered by such a network of railways that very few settlements are more than a few miles from a railway station. In Great Britain these lines up to 1st January, 1948, were controlled by four main companies—the London and North Eastern Railway (L.N.E.R.), the London Midland and Scottish Railway (L.M.S.), the Great Western (G.W.R.), and the Southern Railway (S.R.). The railways are now nationalized. They are organized in six regions, under the Railway Executive—the London Midland region, with headquarters at Euston, the Western, with headquarters at Paddington, the Southern (Waterloo), the Eastern (Liverpool Street), the North-Eastern (York), and the Scottish (Glasgow).

The old L.N.E.R. main line runs from King's Cross to Edinburgh, via Peterborough, Grantham ($52^{\circ} 55' \text{ N } 0^{\circ} 38' \text{ W}$), Doncaster, York ($53^{\circ} 58' \text{ N } 1^{\circ} 4' \text{ W}$), Northallerton ($54^{\circ} 21' \text{ N } 1^{\circ} 26' \text{ W}$), Durham, Newcastle, and Berwick ($55^{\circ} 46' \text{ N } 2^{\circ} 22' \text{ W}$). Note that in a journey on this line northward from London, one would leave the Thames basin, skirt the Chiltern Hills, and then cross the fertile agricultural land of the Fenland, Lincolnshire and the Vale of York. Farther northward this line runs through the industrial region of the Northumberland and Durham coal-field before crossing the Tweed and proceeding to Edinburgh along the coastal plains east of the southern uplands.

From Liverpool Street the main lines run (a) to Cambridge, Ely, and King's Lynn, and (b) farther eastward to Ipswich and Norwich as well as the fishing ports of Yarmouth and Lowestoft. A branch of the last line also

serves Harwich (51.57 N. 1.17 E.), which has considerable passenger traffic with the Continent via the Hook of Holland (51.57 N. 4.5 E.)

The London Midland region comprises central and north-western England, but the two main lines only will be considered. The first, the London terminus of which is St. Pancras, runs through the Luton Gap in the Chilterns to Bedford, and then proceeds across the Northampton uplands to Leicester. From here the line runs along the eastern side of the Pennines to Derby, Sheffield, and Leeds, and in so doing it leaves the agricultural regions which characterized the line to the South, and enters the industrial areas of the Yorkshire coal-field. From Leeds the Pennines are crossed by the Aire Gap, and the line then follows the upper Ribblesdale valley to Carlisle. Carlisle is also served by the second line which starts from Euston and runs north to Rugby (52.23 N. 1.14 W.), Stafford (52.48 N. 2.8 W.), Crewe (53.5 N. 2.25 W.), Wigan, Preston, and Lancaster (54.4 N. 2.48 W.). From here it crosses Shapfell into the Eden valley, and then runs down to Carlisle. Notice that this line runs (a) through agricultural land to the south, (b) near the Black Country and the North Staffordshire pottery area, (c) through the dairy-farming lands of Cheshire and Lancashire, and (d) through part of industrial Lancashire.

The Western region railways serve Western England and South Wales, and here again there are two main lines to be noted. Both start from Paddington, the London terminus, and run to Reading. From here one line follows the Reading Gap between the White Horse Hills and the Chilterns to Swindon. At Swindon the line divides, and one branch skirts the Cotswolds by means of the Avon valley, thereby serving Bath (51.25 N. 2.22 W.) and Bristol (51.28 N. 2.33 W.), while the other proceeds across the Cotswolds. Via the Severn tunnel Newport is reached, and from here the main line connects up the South Wales ports—Cardiff, Swansea, and Llanelli. Fishguard (52.0 N. 5.0 W.), on the west coast, is a packet station, and has steamer communication with Rosslare (52.15 N. 6.22 W.) in South-east Ireland.

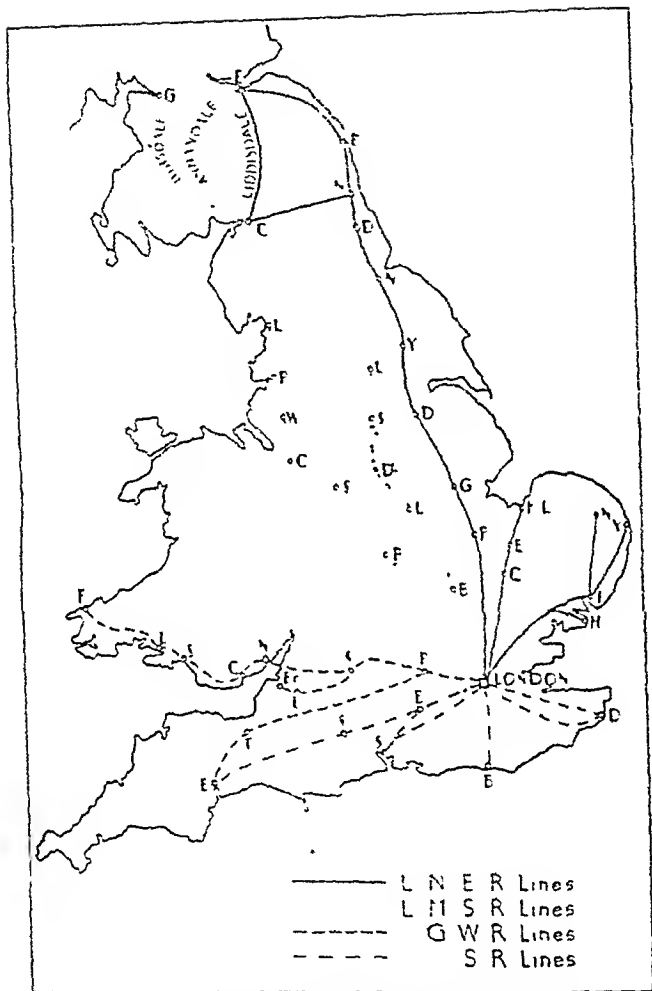


FIG 102 MAIN RAILWAY LINES OF GREAT BRITAIN
BEFORE NATIONALIZATION

Identify each of the main stations (indicated by initials). Note how the main lines focus on London

From Reading the other line crosses Salisbury Plain and the plain of Somerest to Taunton (51.0 N. 3.6 W.), and thence proceeds to Exeter (50.44 N. 3.30 W.) down the valley between Exmoor and the Blackdown Hills.

From London there are many separate lines to the south coast ports and holiday resorts, especially Dover (51.8 N. 1.19 E.), Folkestone (51.6 N. 1.11 E.), Brighton (50.50 N. 0.9 W.), Portsmouth (54.47 N. 1.5 W.), and Southampton (50.54 N. 1.21 W.). The longest line, that from Waterloo (London) to Exeter, proceeds via Basingstoke (51.17 N. 1.4 W.) and Salisbury (51.5 N. 1.46 W.).

K. Ports

LONDON

A settlement, which has since become London, sprang up at the lowest possible place for a ford. At a later date, bridges were built, and as a result, London became a road centre. Ease of communication inland eventually made this town a road and rail focal centre for a very large area. The Thames experiences a double tide, and this fact helps to make the river navigable for ocean-going vessels as far as London. Its situation facing the Continent gives London great advantages for control of much entrepôt trade, which supplements its normal trade as a port.

Its fortunate position as a route, trading and administrative centre has resulted in the continual growth of London, until its population is now about 8,000,000. The existence of such a huge market and the ease with which raw materials can be collected, have led to the development of many varied industries in and around London, in spite of the fact that neither raw materials nor power resources are to be found near by.

LIVERPOOL (See Fig. 95)

This port ranks first in the British Isles as far as exports are concerned. Its position on the Mersey gives it a good harbour, and it is backed by highly industrialized regions with which it possesses excellent communications by rail and water. Much produce from Lancashire and the Midlands is sent through Liverpool, and thus the chief exports

consist mainly of manufactured textiles, iron and steel goods and machinery, together with woollens from the West Riding of Yorkshire. The imports include materials for industry, especially raw cotton, and foodstuffs, such as meat and grain, to feed the large population of its hinterland.

The ease with which raw materials can be collected has led to the development in and around Liverpool, of industries, the chief of which are soap making, oil refining, and flour milling, while her shipping activities have resulted in industries connected with shipbuilding and engineering.

In addition, Liverpool has considerable passenger traffic with all parts of the world.

MANCHESTER

Manchester has developed as the result of the Manchester Ship Canal, and is now the fourth largest port in the British Isles. Cotton and grain are the chief imports, while cotton manufactures and machinery are the chief exports.

HULL

This is the third port of Great Britain, and includes in its hinterland the industrial regions of Yorkshire and the agricultural regions of the Vale of York and the Eastern Midlands. Situated on the Humber, it has a well-sheltered position, and ease of communication inland by means of the Aire, Calder, and Trent waterway systems. Further, Hull is well-situated for trade with Europe and for participation in the North Sea fishing industry.

As a result of these varied factors, Hull has a diverse trade. The chief imports, however, are of grain, soya beans, dairy produce and timber, while the chief exports are of coal, machinery, and textiles.

SOUTHAMPTON

This port has a well-sheltered position and a double tide daily. Docks have been built which will accommodate ocean liners, and this fact, together with the establishment of fast train services to London, has enabled Southampton to develop a great passenger traffic. Following this passenger traffic, a great import and export trade has been built

up, and this port now ranks fifth in the United Kingdom. Meat, dairy produce, wool and fruits, and tropical products are imported, while the miscellaneous exports include textile manufactures

BRISTOL

Bristol has lost much of its original trade to Liverpool and Southampton, but still imports a certain amount of

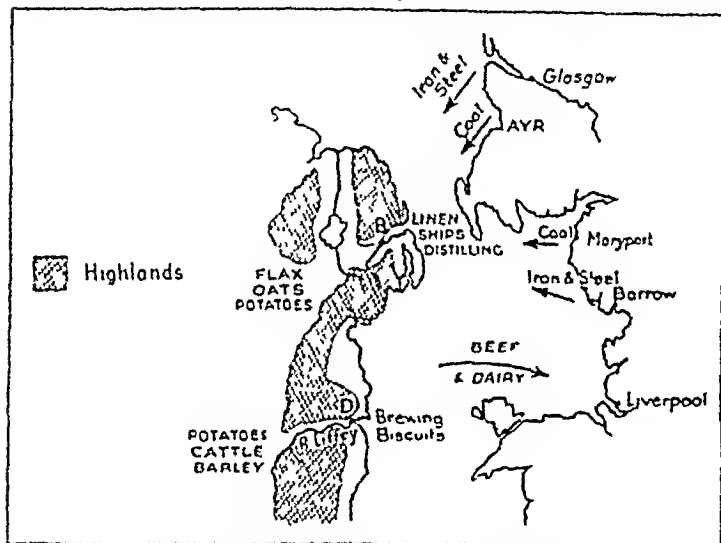


FIG. 103. POSITIONS OF BELFAST AND OF DUBLIN

tropical produce, especially tobacco, cane sugar, cacao, and bananas.

Local manufacturing industries include those connected with the preparation of tobacco, sugar, and cocoa

GLASGOW

This town is both a port and a great shipbuilding centre. The Clyde waterway has been deepened to allow the passage of ocean liners up to Glasgow, which now acts as the outlet for the industrial regions of the central lowlands. The chief exports are of coal, iron and steel goods, ships,

and textile products, while the imports include iron ore, timber, and varied foodstuffs

BELFAST

The position of Belfast on a good estuary facing Great Britain has enabled it to become the chief port of Northern Ireland. It acts as an outlet for agricultural produce of the plainland of the interior, and the ease with which it can collect raw materials from its hinterland, Scotland, and from England has enabled it to build up linen and ship-building industries

DUBLIN

This, the chief port of the Irish Free State, has an excellent harbour on the Liffey, and excellent communications inland between two hilly regions. It can, therefore, act as a collecting centre for the agricultural produce (especially dairy produce) of the central plain, and is excellently placed for trade with the industrial region of Lancashire. Brewing and the manufacture of biscuits are two important industries

L Trade of the British Isles

Ireland is still primarily concerned with the export of agricultural produce in exchange for manufactured goods, but of Great Britain the reverse is true. Although agriculture is very important, Great Britain is predominantly industrial, and she must, therefore, import foodstuffs and industrial raw materials which she lacks, in exchange for her manufactured articles. This trade is enormous and diverse, but the chief imports include cereals, meat, dairy produce, tropical products, timber, raw cotton, wool, and petroleum while the exports consist largely of coal, manufactured textiles, machinery, and chemicals. As well as the normal import and export trade, there is *entrepôt* trade. This trade consists of the bulk import by Britain of certain commodities, and their re-export to other European countries. Chief among these commodities are tea and wool.

- Arica, 242, 245, 248
 Arizona, 100, 210
 Arkansas, 99, 247
 Arica, 124
 Arno, River, 285
 Arroyo basin, 197
 Artificial silk, 101
 Asbestos, 217
 Asia, 59, 61, 62, 71, 92, 110, 118, 133, 141-170, coal resources, 148-149, physical features, 141-143, climate, 145-147, natural regions, 145-147, mineral wealth, 148-150, communications, 150-152
 Assam, 71, 119
 Asuncion, 122, 248
 Aswan, 180, 189
 Asyat, 180
 Atacama Desert, 242
 Athab, 189
 Athens, 266
 Atlantic, the, 21, 26, routes of, 126, 130
 Atlas mountain region, 171
 Atmosphere, the, 13-22
 Auckland, 139, 207, 208
 Peninsula, 206
 Australia, 47, 61, 67, 68, 77, 79, 89, 88, 91, 98, 99, 100, 101, 105, 117, 139, 192-209, physical, 192, 194, climate, 194-196, natural regions, 196-199, minerals, 199-201, communications, 201-203
 Austria, 98
 Ayr coal field, 92, 324
 Ayrshire, 310
 Azores, 190, 234
 Azov, Sea of, 251

 Baffin Bay, 127
 Baghdad, 139, 147
 Bahia, 244
 Blanca, 102, 244, 245
 Baikal, Lake, 150
 Baku, 94, 149, 281
 Balearic Isles, 252
 Balkan Mountains, 251
 Ballarat, 299
 Baltic Sea, 123, 251
 Baltic States, 85
 Baltimore, 128, 229, 270
 Baluchistan, 153
 Bamberg, 46, 51
 Bananas, 85
 Banat, 152, 161
 Banda, 169, 150
 Banu River, 309
 Barbados, 210
 Barcelona, 265
 Barb, 49, 70
 Barrow Lillfield, 270
 Baruch, 327
 Barranquilla, 242
 Basle, 113, 122, 251
 Basra, 139, 147
 Batavia, 147
 Bechuanaland, 177, 178
 Bedford, 309
 Beira, 134, 178, 199
 Belfast, 311, 318, 324, 334
 Belgian Congo, 171, 173, 175
 Belgium, 52, 93, 100, 262, 263
 Belgrade, 125
 Bolton, 100, 156
 Belle Isle, 225
 Bengal, 83, 160
 Benguela current, 26, 184
 Bergen, 259
 Berlin, 276, 289
 Bhutan, 71
 Bilbao, 265
 Birmingham (England), 105, 112, 322, Canal, 327 (U.S.A.), 96, 229
 Biscay, Bay of, 251
 Black Forest, 34, 35, 251
 Sea, 124, 251
 Blackburn, 315
 Black mountains, 34
 Blue Nile, 179, 180
 Bohemian massif, 254
 Bolan Pass, 153
 Bohemia, 43, 99-100, 120, 236, 242
 Bologna, 285
 Bolton, 112, 315, 324
 Bombay, 108, 115, 135, 136, 151, 156, 158

- Bordeaux, 272
 Bore, 29
 Borneo, 141, 147, 149
 Boston, 137, 229, 230
 Bothnia, Gulf of, 251
 Bradford, 112, 318
 Brahmaputra River, 69, 83, 151
 Brazil, 41, 69, 71, 74, 75, 82, 101,
 122, 129, 238, 244, 245, 248
 Brazilian current, 20, 240
 Bremen, 276, 277
 Brenner Pass, 285
 Breslau, 123, 173
 Brest, 272
 Brindisi, 138, 285, 286
 Brisbane, 136, 139, 197, 202,
 203
 Bristol, 329, 333
 British—
 Columbia, 53, 56, 86, 87, 102,
 131, 210, 218, 220-221, 223
 East Africa, 177, 179
 Guana, 239, 244
 Honduras, 210
 Isles: position, 293, seas and
 coasts, 293-295, physical
 features, 295-301, climate,
 301-303, minerals, 303-
 305; agriculture, 305-311,
 fishing, 311-313; cotton
 manufacture, 314-316,
 woollen manufacture, 316-
 318, iron and steel manu-
 facture, 324; chemical in-
 dustries, 324; pottery, 319;
 population, 325, canals,
 325-326; railways, 328-
 331; ports, 331-334; trade,
 334-335
 Brittany, 267-269
 Brixham, 313
 Broken Hill (Australia), 99, 100,
 200, 203
 (Rhodesia), 138
 Bromberg, 278
 Brussels, 203
 Bucharest, 125, 261
 Budapest, 125, 261
 Buenos Aires, 102, 122, 129, 137,
 246, 248
 Buffalo—
 town of, 113, 230, 232
 (animal), 119
 Bulawnyo, 138, 178, 187, 190
 Burgundy canal, 123
 Burma, 69, 87, 101, 141, 148,
 149, 152
 Burnley, 315
 Bury, 112
 St Edmund, 308
 CACAO, 75
 Cairns, 202
 Cairo, 180, 182, 189
 Calcutta, 83, 139, 148, 151
 Calgary, 219, 220, 222, 224
 California, 37, 43, 47, 70, 77, 94,
 99, 102, 131, 212, 215, 227,
 228
 Callao, 132, 242
 Camels, 119
 Camphor, 51
 Campsies, 296
 Canada, 56-59, 61, 62, 67, 68,
 70, 71, 76, 78, 79, 80, 81,
 84-88, 90-92, 98-99, 100,
 101, 111, 113, 115, popula-
 tion, 217; mineral wealth,
 217; forest industries, 217-
 218, furs, 218-219, agri-
 culture, 219-221; manu-
 factures, 221, cities, 221-
 223, communications, 224;
 trade, 224-225
 Canadian—
 National Railway, 224
 Pacific Railway, 224
 Canals, 123-124
 Canaries current, 26
 Canary Islands, 85, 130, 190
 Cancer, Tropic of, 4-6, 15
 Cannock Chase, 297
 Cantabrian Mountains, 252
 Canterbury (New Zealand), 80
 Plains, 207
 Canton, 151, 164
 Cape—
 Breton Island, 91, 98
 Colony, 53, 77, 183, 185
 Horn, 129, 132, 133

Cape—(contd.)

- of Good Hope, 134, 135
- Town, 130, 138, 187
- Verde Isles, 190
- Capricorn, Tropic of, 4-6, 18
- Cardiff, 323
- Carlisle, 112
- Carolinas, 81, 228
- Carpathians, 61, 254, 278
- Carrara, 284
- Carse of Gowrie, 306
- Cartagena, 100
- Casablanca, 183
- Caspian Sea, 51 125, 141, 251, 255
- Catania, 286
- Cattle, 42, 56, 59, 70, 77-80, 177, 183, 186, 197, 227
- Caucasus, 141, 234
- Celebes, 145, 147
- Centralization of industry, 104
- Cereals, 65-71
- Ceylon, 74, 84, 101, 148, 150
- Chad, Lake, 171
- Chalk scarplands, 298-299
- Challenger Deep, 24
- Champlain, Lake, 221
- Channel Isles, 295
- Charnwood Forest, 297
- Charters Towers, 200
- Chattanooga, 96
- Chemnitz, 276
- Cherbourg, 128, 272
- Cheshire, 78, 324
- Chesterfield, 318
- Cheviot Hills, 296
- Chicago, 104, 105, 137, 229, 230, 231, 232
- Chile, 37, 43, 47, 53, 55, 93, 99, 101, 236, 240, 242, 243-244
- Chiltern Hills, 299
- China, 44, 50, 51, 67, 69, 71, 81, 83, 88, 93, 98, 100, 133, 139, 141, 148, 149, physical features, 161-162, climate, 162, agriculture, 162-164, manufactures, 164, trade and ports, 164
- Christchurch, 208
- Churchill, 128, 220
- Cient Hills, 297
- Cleveland (U S A), 104, 113, 229 (Yorkshire), 298, 320
- Climate and its place in industry, 106
- Climatic regions general, 37-39, equatorial, 40-41, Sudan, 41-42, Sahara, 42-43; monsoon, 44-47, Mediterranean type, 47-49, China type, 50-51, cool temperate, 53-60, cold temperate, 60-62, tundra, 62-63
- Clyde, River, 296, 315
- Coal, 89-93, 111, 116, 187, 201
- Coblentz, 122
- Coffee, 41, 46, 74-75 177
- Colchester, 313
- Cologne, 113, 122, 275
- Colombia, 41, 74, 94, 242
- Colombo, 135, 136
- Colon, 128
- Colorado, 43, 91, 99, 217
- River, 212
- Compass traverse, 10
- Concepcion, 243
- Congo—
 - Basin, 40, 84
 - River, 120, 171
- Coniferous trees, 51, 55, 57, 61, 85, 120, 147, 150, 259
- Constanta, 261
- Continental—
 - shelf, 24, 87, 293
 - type of climate, 18, 58, 60, 67
- Contour sections, 12
- Contours, 11-12
- Cook Isles 205
- Coolgardie, 112, 200
- Copenhagen, 262
- Copper, 96, 100, 200
- Copra, 84
- Corby, 323
- Cork, 311
- oak, 49
- Cornwall, 100, 304
- Coromandel Peninsula, 208
- Corsica, 252

Cotswold Hills, 298-299
 Cotton; raw, 46, 49, 51, 52,
 81-82, 156, 163, 178, 186,
 228, manufacture and
 trade, 106, manufactures;
 in India, 158, in China,
 164, in U.S.A., 229, in
 France, 270, in Germany,
 276, in Italy, 285, in
 British Isles, 314-316

Coventry, 322

Cracow, 124

Crefeld, 276

Crete, 252

Creusot, Le, 271

Crops, rotation of, 161

Cuba, 75, 76, 234

Cumberland, 92, 310

Currents (ocean), 25-27

Cyprus, 252

Czechoslovakia, 93, 98, 123

Czechwan, 148

DAIREN, 161

Dairy produce, 57, 79

Dakota, North and South, 227

Damascus, 150

Damodar valley, 93

Danube valley, 77, 124, 125,
 254, 261

Danubian countries, 83

Danzig, 273

Dar-es-Salaam, 177-189

Darling River, 193, 199

Darlington, 32

Date palm, 43, 85

Dawson City, 112

Deccan, 154, 156

Decentralization of industry,
 104

Deciduous forests, 51, 55, 57, 87

Delhi, 139, 151

Deltas, 32, 68

Denmark, 79, 124, 262

Denudation, 30, 32

Deposition, 30, 32

Derby, 318

Derbyshire, Peak of, 297

Deserts, 179, 197

Detroit, 230, 232

Development Areas, 325

Dewsbury, 318

Diamonds, 101, 106, 187

Dinaric Alps, 254

Dnieper River, 125, 255, 283

Dogger Bank, 311

Don River, 125, 255, 283

Donetz, 281

Dortmund, 275

Douro valley, 77

Drakensberg, 184, 187

Dresden, 123

Dublin, 311, 334

Dudley, 322

Duisburg, 122, 275

Duluth, 104, 105, 229

Dundee, 83, 318

Dunedin, 209

Dunes, 31

Dunkirk, 270, 272

Durban, 134, 135, 187

Durham, 103, 105

Dursley, 316

Dusseldorf, 275

EARTH movement, 3-5

East—

 Anglia, 76, 299, 307, 308

 Indies, 40, 41, 76, 77, 84, 85,

 94, 117, 135, 136, 149, 244

Ebeny, 41

Ebro River, 265

Ecuador, 242

Eden valley, 113, 297

Edinburgh, 92

Edmonton, 111, 219, 222, 224

Egypt, 77, 82, 103, 177, 179,

 180, 182, 183

Eire *See* Ireland

Elba, 284

Elbe River, 123, 254

Electricity, 95, 104

Elephants, 119

Elisabethville, 190

Ely, 307, 308

Emden, 275

Ems-Dortmund canal, 122, 275

England *See* British Isles

Entrepôt trade, 117

- Equatorial type of climate and vegetation, 37, 40-41, 76, 85, 87, 110, 118, 119, 173-176, 240
- Equinoxes, 4, 5
- Erne, 104, 113
canal, 120, 240, 241
Lake, 113, 124, 224, 229
- Etruria, 287
- Fitz-Geborge, 274
- Fischer, 262
- Estuaries, 61
- Esquimault, 224
- Essen, 275
- Estonia, 261, 263
- Eucalyptus, 51, 196
- Euphrates River, 141
- Europe, 53, 59, 61, 62, 67, 69-71, 74, 75, 77, 79, 118 position, 251, physical, 251-255, climate, 255-258 natural regions, 258-266, countries, 266-287, railways, 287-289, population, 289
- Exshaw, Vale of, 298
- Fyfe, Lake, 194
- FALKLAND ISLANDS, 53, 246
- Fall River, 220
- Faults, 34
- Fenland, 298, 307
- Fifeshire, 92
- Fiji Islands, 85
- Finland, 86, 259
Gulf of, 251
- Fjords, 252
- Fish, 87-88
- Fishing, 167
in British Isles, 311-313
- Fiume, 286
- Flax, 56, 82-83
- Fleetwood, 312-313
- Florence, 84, 285
- Florida, 3
- Fold mountains, 34
- Forest products, 84-87
- Formosa, 76, 166
- Fort William, 113, 224
- North and Clyde canal, 328
- France, 67, 76, 77, 79, 83, 91, 95, 98, 100, 123, 137, 262, 266, 272
- Frankfurt-on-Main, 273
- Fraser River, 220, 224
- Fraserburgh, 313
- Freetown, 130, 175
- Fremantle, 136
- French Isles, 252
- Frodingham, 324
- Frome, 316
- Fundy, Bay of, 217
- Fujyama, 166
- Furness, 98
- Fusan, 152
- GALASHIELS, 317
- Galatz, 261
- Galveston, 228
- Ganges River, 69, 83, 120, 143, 151
- Garonne River, 123, 254, 268
- Gateshead, 320
- Gdyma, 279
- Geelong, 201
- Genoa, 255, 286
- Geographical inertia, 108
- Georgetown, 244
- Georgia, 81, 228
- Germany, 61, 70, 76, 77, 79, 80-83, 86, 87, 92, 95, 98-101, 137, 271-278
- Ghats, Eastern and Western, 143, 153
- Ghent, 83, 263
- Gibraltar, 117, 135, 265
- Gippsland, 201
- Glasgow, 114, 116, 310, 319, 328
- Glen More, 295
- Goats, 43, 49
- Gobi, 119, 143
- Gold, 96, 98-99, 118, 186, 187, 189, 199
Coast, 175
- Goole, 318
- Grand Junction Canal, 326
- Great—
Barrier Reef, 193
Britain, See British Isles
Circle sailing, 126, 130

- Great—(*contd.*)
 Lakes, 105, 113, 115, 120, 213, 217, 220, 221, 224, 231
 Greece, 49, 263, 266
 Greenland, 63, 127
 Greenwich, 8
 Guadalquivir River, 254
 Guinea Coast, 40
 Gulf—
 of Guinea, 75, 85, 173, 175
 Stream, 26
- HAARLEM, 262
 Hail, 22
 Halifax (England), 127, 128, 318
 (Nova Scotia), 222
 Hamburg, 114, 123, 128, 276, 277
 Hango, 259
 Hankow, 149, 151, 164
 Harbin, 150, 152
 Hardwoods, 41, 85
 Harz Mountains, 31
 Havana, 128, 234
 Havre, Le, 270-272
 Hawaii, 130
 Hawick, 317
 Hawke's Bay, 207
 Hebrides, 295
 Helsingfors, 259
 Hemp, 56, 83
 Highlands of Scotland, 295, 296
 Himalayas, 31, 61, 71, 143
 Hindu Kush, 141
 Hinterlands of ports, 114, 117
 Hispaniola, 234
 Hobart, 135, 205
 Holland, 87, 122, 137
 Hollywood, 108
 Hong Kong, 6, 130, 164
 Honolulu, 130, 132
 Honshu, 166
 Horses, 119, 120
 Huddersfield, 112, 318
 Hudson—
 Bay, 212, 222
 Mohawk Gap, 115, 230
 River, 221, 231
 Hull (Canada), 222
 (England), 114, 116, 312, 332
- Hungary, 69, 260
 Huron, Lake, 224
 Hwang Ho River, 120, 143, 151, 161
 Hyderabad, 151
 Hydro electricity, 221, 222
 Hydrosphere, the, 24-29
- ICELAND, 252
 Idaho, 99
 Illinois, 91, 94
 India, 44, 46, 65, 69, 71, 75, 76, 80, 81, 82, 98, 99, 101, 119, 136, 139, 149; physical, 152-154, rainfall and agriculture, 155-156; manufactures, 157-159; trade and ports, 159; partition, 160-161
 Indian Ocean, 25, 26
 Indus, 227
 Indo-China, 41, 69, 149, 161
 Indus River, 67, 143
 Industry, factors leading to establishment of, 102-108
 Ionian Sea, 251
 Ipswich, 324
 Iquique, 243
 Iquitos, 247
 Ireland, 82, 301, 307, 311. (*See also* British Isles)
 Irkutsk, 148, 150
 Iron, 96-98, 103, 149, 200
 and steel manufactures, in India, 159, in China, 164, in Australia, 201, in Canada, 221, in U.S.A. 229, in France, 271, in Germany, 274-276, in British Isles, 319-324
 Gate, 255
 Knob, 98, 103, 200
 Irrawaddy River, 68, 120, 143, 149, 152
 Irrigation, 46, 49, 68, 147, 155-156
 Isotherms, 14-18
 Italy, 83, 95, 98, 283, 287
- JAMAICA, 85, 210, 234

- Japan, 50, 51, 69, 82, 83, 88, 93,
 99, 101, 108, 133, 148, 151,
 physical features, 166; cli-
 mate, 166-167; agriculture
 and fishing, 167, manu-
 factures, 167-168, trade
 and towns, 168-169
 Jibuti, 189
 Johannesburg, 99, 112, 138, 187
 Jubbulpore, 151
 Juyuy, 246, 248
 Jura Mountains, 252
 Jute, 83, 158

 KALAHARI Desert, 43, 175, 179
 Kalgoorlie, 200
 Kamchatka current, 26, 145
 Kansas, 69, 94, 227
 Kansas City, 229, 232
 Kansu, 93
 Karachi, 6, 136, 139, 151
 Karri, 199
 Karroo, 184
 Katanga, 100, 178
 Katowice, 279
 Kenya, 138, 177
 Kettering, 323
 Kharkov, 281
 Khartoum, 138, 180, 182, 189
 Kherson, 263, 283
 Khurkiz, 52, 147
 Khyber Pass, 153
 Kicking Horse Pass, 224
 Kidderminster, 316
 Kiel, 276
 Canal, 124
 Kigoma, 189
 Kilmarnock, 310
 Kimberley, 101, 138, 187, 189
 King's Lynn, 308, 313
 Kingston, 128, 234
 Kirkcaldy, 319
 Kirkcudbright, 306, 319
 Kisumu, 138
 Kobe, 168
 Königsberg, 277
 Korea, 149, 164, 166, 168
 current, 167
 Krakow, 277, 281
 Krefeld, 83

 Kuro Siwo, 26, 144, 167

 LA Paz, 242, 248
 La Plata, 246
 Labrador, 225
 current, 26
 Ladysmith, 187
 Lagon River, 309
 Lagos, 130, 175
 Lahore, 151
 Lake District, 98, 296-297
 Lanarkshire, 92, 98, 315, 319
 Lancashire, 82, 92, 103, 104,
 106-108, 112, 113, 307, 308,
 310, 318
 Lapps, 63
 Latitude, 5-6
 Latvia, 261, 263
 Launceston, 207
 Laurentian shield, 212
 Lead, 96, 99, 200
 Leeds, 318
 and Liverpool Canal, 327
 Leeward Isles, 210
 Leghorn, 284, 285
 Leicester, 310, 315, 316, 325
 Leicestershire coal-field, 92
 Leipzig, 273
 Lena valley, 148
 Leningrad, 150, 259, 262, 283
 Lerwick, 313
 Lesser Antilles, 234
 Libya, 287
 Lille, 270
 Lima, 99
 Limestone escarpment, 298-299
 Lumpopo River, 171
 Lincoln, 323, 324
 Edge, 298
 Linseed, 82
 Lisbon, 264
 Lithosphere, the, 29-36
 Lithuania, 261, 263
 Liverpool, 114, 115, 128, 318,
 331-332
 Llana, 120, 242
 Llanos, 245
 Loango, 130
 Lodz, 279

- Loess, 34, 162
 Lofoten Isles, 252
 Loire River, 123, 254
 Lombardy, Plain of, 283
 London, 113, 114, 116, 117, 325
 Londonderry, 318
 Long Island, 230
 Longitude, 6, 7
 Lotraine, 98, 269, 271
 Los Andes, 218
 Los Angeles, 232
 Lothian, 304
 Louisiana, 76, 226
 Lourenço Marques, 116, 131, 135, 187
 Lowestoft, 312
 Lübeck, 277
 Lucerne, 49, 198
 Lumbering, 56
 Luxembourg, 98
 Łódź, 279
 Lyell, Mount, 200
 Lyons, 83, 111, 124, 271
- MACCLESFIELD, 318
 Mackenzie River, 213
 Madagascar, 76, 190
 Madeira, 130, 190
 Madras, 151
 Madrid, 265
 Magdalena River, 236, 242
 Magdeburg, 123, 273
 Magellan Straits, 129, 133
 Mahogany, 41, 87
 Main River, 274
 Mainz, 122, 254
 Maize, 40, 51, 69-70, 161, 165, 175, 183, 197, 227
 Malaga, 265
 Malay Peninsula, 11, 69, 81, 100, 117, 244
 Multa, 117, 135, 202, 287
 Malvern Hills, 297
 Man, Isle of, 295
 Manaoa, 214, 247
 Manchester (England), 115, 315, 324, 327, 332
 Ship Canal, 104, 115, 315, 324
 (U.S.A.), 229
- Manchukuo (Manchuria), 56, 57, 67, 68, 149, 161, 165, 168
 Mandalay, 152
 Manila, 77
 Maps of small areas, 9-10
 Maracaibo, 242
 Gulf of, 242
 Maritime Provinces, 219
 Marseilles, 115, 121, 136, 138, 270, 272
 Maryport, 324
 Massif, Central, 252, 268
 Mathematical Geography, 3-12
 Mauritius, 76, 135, 136, 190
 Medina, 150
 Mediterranean countries, 263, 266
 Mediterranean type of climate, 37, 47, 50, 65, 67, 76, 110, 119, 175, 185, 195, 199, 207, 215, 228, 240, 243, 263-264
 Mekong, 69, 143, 149, 152
 Melbourne, 116, 136, 201, 202-204
 Memel, 263
 Menam River, 113
 Mendoza, 216, 218
 Mersey River, 315
 Merthyr Tydvil, 323
 Meseta of Spain, 352, 365
 Messina, 286
 Mestizes, 249
 Metz, 271
 Mouse River, 93
 Mexico, 43, 94, 99, 100, 210, 233-234
 City, 99, 233
 Michigan, Lake, 231
 Middlesbrough, 321
 Middlewich, 305
 Midland Plain, 297, 298
 valley of Scotland, 35
 Milan, 285
 Mikura, 199
 Millets, 40, 51, 71, 156, 163, 165
 Milwaukee, 101, 105, 230
 Minas Geraes, 245
 Mineral wealth, of Asia, 148-150; of S. Africa, 186, 187, of Australia, 199-201, of

- Northumberland and Durham
 coal-field, 92, 103, 105, 320-
 321, 324
 Northwich, 305
 Norway, 85-87, 95, 252, 259
 Norwich, 111, 324, 325
 Nottingham, 315, 316
 Nova Scotia, 91, 219, 221, 222
 Nyasa, Lake, 173
 Nyasaland, 82

 OASES, 43, 110
 Oats, 62, 71
 Ob River, 141
 Oban, 313
 Ochil Hills, 296
 Oder River, 123, 124, 254
 Odessa, 263, 283
 Ohio—
 River, 213, 232
 State, 70, 77, 95, 227
 Oil, 93-95, 104, 116
 palm, 41, 85
 seeds, 51, 156
 Oklahoma, 81, 94, 99
 Oldham, 112, 315
 Omaha, 232
 Omsk, 150
 Ontario, 86, 99, 221
 Lake, 121, 217, 224
 Oporto, 264
 Oran, 183
 Orange Free State, 53, 185
 River, 171, 184
 Oregon, 86, 226
 Orient Express, 289
 Orinoco River and Valley, 41
 110, 236, 239, 248
 Orkneys, 295
 Osaka, 168
 Ostend, 115, 203
 Otago Plateau, 207
 Ottawa, 86, 221, 222
 River, 222
 Ox-bow Lake, 33, 34
 Ozark Mountains, 99, 100

 PACIFIC, the, 25, 26
 routes, 130
 Pakistan, 152, 156, 160-161

 Paisley, 315
 Palermo, 286
 Pampas, 245
 Panama Canal, 86, 124, 128-
 130, 132-133, 136, 226
 Para, 244
 Paraguay—
 River, 236, 240, 248
 State, 122, 124
 Parana River, 122, 236, 240,
 246, 248
 Paris, 114, 138, 272, 287
 Patagonian current, 26
 Paterson, 83, 229
 Paysandu, 248
 Peking (Peiping), 150, 151, 161
 Penang, 150
 Peneplains, 35, 36
 Ponnine, 22, 34, 78, 92, 297
 Pennsylvania, 93, 95, 103, 105,
 114
 Penzance, 313
 Perm, 281
 Pernambuco, 137, 244
 Persia, 95, 149
 Perth, 203, 201
 Peru, 70, 101, 120, 230, 240
 Peruvian current, 26
 Peshawar, 153
 Peterborough, 304, 324
 Peterhead, 313
 Petroleum, 93-95, 149
 Philadelphia, 128, 229, 230, 231
 Philippine Islands, 83, 147, 148
 Pittsburgh, 103, 105, 114, 122,
 137, 229, 230, 232
 Planetary wind system, 18, 19
 Plastics, 101
 Plateaux, 36
 Po River and Valley, 69, 254,
 283
 Poland, 76, 93, 98, 100, 124, 273
 Polders, 262
 Population, Distribution of
 world, 108-111
 Port—
 Arthur (Asia), 152, 165
 (Canada), 113, 224
 Augusta, 203
 Chalmers, 208

Port—(contd.)

- Darwin, 202, 203
 Elizabeth 184, 189
 Pirie, 200, 203
 Said, 136, 182
 Sudan, 182
 Portland Bill, 298
 Porto Rico, 226, 234
 Ports, factors aiding develop-
 ment of, 112, 115
 Portugal, 77, 263, 264
 Potomac River, 232
 Pottery, 324-325
 Power (General), 89-96, 103-104
 See also Mineral Wealth
 Prairies, 52, 59, 67, 80, 212
 Precipitation, factors causing,
 21-22 *See also* Climate
 Regions
 Preston, 315
 Pretoria, 187, 189
 Prince—
 Edward Islands 219
 Rupert, 224
 Providence, 229
 Punjab, 149, 155
 Pyrenees, 152, 168

 QUEBEC, 86, 128, 217, 219, 222
 Queensland, 50, 51, 69, 76, 78,
 82, 110, 193, 194, 196, 197,
 200
 Quetta, 153

 RAILWAYS of Asia, 150-152,
 of S. Africa, 187; of
 Australia, 201-202; of
 Canada, 224; of U.S.A.,
 232; of S. America, 248;
 of Europe, 283; of British
 Isles, 325-327
 Rain shadow, 22
 Rainfall *See* Precipitation and
 Climatic Regions
 Rangoon, 136, 139, 140, 152
 Rayon, 101
 Reading, 307
 Red Sea, 136
 Regina, 222, 224

 Roundbar, 52, 120
 Rendrew Heights, 296
 Representative Fraction, 9
 Revel, 263
 Revolution of Earth, 4
 Rhine River, 77, 88, 104, 113,
 122, 123, 251, 273, 274
 275
 Rhodesia, North and South, 41,
 77, 101, 138, 177, 178
 Rhône River, 115, 123, 251
 Rice, 47, 49, 51, 68-69, 111, 153,
 159, 163
 Rift valleys, 35
 Rio—
 de Janeiro, 115, 129, 137, 244
 de la Plata, 246
 Grande, 217
 Riverina, 199
 Rivers, as agents modifying the
 earth's surface, 31, as
 form of power, 95, as
 means of communications,
 120-132
 Rockdale, 321
 Rockhampton, 197
 Rocky Mountain system, 34, 36,
 51, 59, 61, 91, 93, 207
 Romania, 69, 94, 260, 261
 Rome, 285
 Romney Marsh, 298, 310
 Root crops, 57
 Rosario, 122, 246, 248
 Rostov, 283
 Rotation—
 of crops, 81
 of world, 3
 Rotterdam, 122, 262, 275
 Roubaix, 270, 271
 Rouen, 271, 272
 Rubber, 41, 84
 Rubies, 96, 101, 148
 Rudolf Lake, 171, 173
 Ruhr River and coal-field, 105,
 122, 271, 274, 275
 Runcorn, 324
 Russia, 58, 59, 67, 70, 76, 82, 83,
 85, 93, 94, 98, 101, 119, 125
 259
 Rye, 57, 62, 70